# LITERATURE ON OSTEOPOROSIS (2002-2004): "A BIBLIOMETRIC STUDY"

## DISSERTATION

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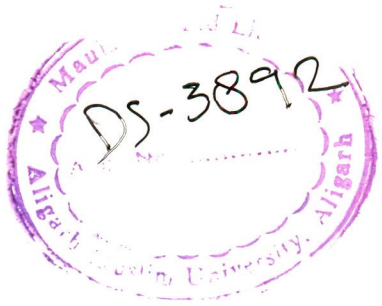


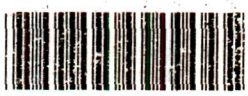

# Dedicated
# to
# My Loving
## Ammi
## (Mrs. Bazm-E-Ara)
## &
## Abbu
## (Mr. Anis Ahmad Ansari)

"For me the Greatest Source of Inspiration & Motivation"

Special thanks to

My Beloved

Brother

Shahnawaz Ahmad

"Bazmi"

&

Sister

Farhana Zeeshan

"Anis"

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## Certificate

*This is to certify that* ***Ms. Farzana Zeeshan*** *has completed her dissertation entitled* ***"Literature on Osteoporosis (2002-2004): A Bibliometric Study"*** *in partial fulfilment of the requirements for the award of the degree of* ***Master of Library and Information Science (2009-2010).*** *She has conducted the work under my supervision and guidance; I deem it fit for submission.*

***Dr. Mehtab Alam Ansari***
*(Sr. Lecturer)*

# CONTENTS

# LIST OF TABLES

# LIST OF DIAGRAMS

# Acknowledgement

# Acknowledgement

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# Chapter -1

# Bibliometrics

# CHAPTER-1

# BIBLIOMETRICS

## 0 INTRODUCTION

Bibliometric is a fast developing area in information science, which is defined as a discipline that investigates the properties and behaviour of information.

Bibliometrics is recent origin and relatively a new one which has emerged as a research front in its own right in information science. It is now being vigorously pursued and with the result, it has been found that one forth of the entire articles published in library and Information Science periodical are on bibliometrics and its releted topic.

It is a discipline concerned with the study of property and behaviour of information as well as the factors influencing the flow of information. This inter disciplinary science is derived from and reated to such field as Mathematics, Logic, Linguistic, Psychology, Computer Technology, Operational Research Graphic Arts, Communication, Library Science Management and other similar fields.

In the present age no single library can afford to acquire each and every document because of the ever growing number of bibliographic units like books, periodical, corresponding increase in the size of library collection number of readers, issue of library materials, increasing cost of journals number of catalogues cards, changes in search strategy and so on.

The only remedy of these problems seems the procurement of limited and selected journals.

A technique has emerged to identify the pattern of publications, authorship citations used for a subject etc. Over a period of time and there by offering insight into dynamics of the area under a particular study. That technique is known today as Bibliometrics.

## 1. BIBLIOMETRICS

Bibliometrics is a relatively new subject or branch of information science. It lies between the border areas of the social science and the physical science. It is a quantitative study of various aspects of literature on a particular topic and is used to identify the pattern of publication authorship, citation and or secondary journal coverage with the objective of getting an insight into the dynamics of the growth of knowledge in the area under consideration. Bibliometrics has gained significance in recent years because of its practical application in various library operations and services, it is estimated that out of total periodical literature published in library and information science at global level 25% are on bibliometrics studies.

## 2. MEANING OF BIBLIOMETRICS

In general Bibliiometrics is that branch of science, which studies the behaviour of information.

Traditionally Bibliometrics is associated with the quantitative measurement of documentary metrials.

The term 'Bibliometrics' was used by A.Pritchard in 1969 to denote a new discipline where quantitative methods were employed to prove scientific communication process by measuring and analyzing various aspects of written documents.

Etymologically the term 'Bibliometrics' is composed of two distinct parts i.e. '***biblio***' and '***metrics***'. The word '***biblio***' is derived from the

combination of the Latin and Greek word '***biblion***' meaning book, paper on the other hand the word *'metrics'* indicates the science of meter i.e. measurement and is also derived either from the latin or Greek word 'metrics' or '***metrikons***' each meaning measurement. So, ***Bibliometrics*** connotes the science of measurements pertaining to books or documents.

## 3. DEFINITION OF BIBLIOMETRICS

Bibliometrics is that branch of science which studies the behavior of information.

We can also say that '***Bibliometrics***' is that branch of information theory attempts to analyze quantitatively the properties and behaviour of recorded knowledge.

Diverse interpretation of the term have been put forward by many authors over the years.

### HULME[1]

"The purpose statistical bibliography is to shed light on the process of written communication and of the nature and course of development of a discipline by means of counting and analysis its various facets of written communication.

### RAISING[2]

"The assembling and interpretation of statistics relating to books and periodicals to demonstrate historical movements, to determine national and

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[1] HULME (E WYNDHAM). Statistical Bibliography in relation to the growth of modern of modern civilization. Butler and Tunner Grafton, 1923, P.9.

[2] RAISING (ML) Statistical Bibliography in the health science. *Bulletin of the Medical Library Association* 50: 1962: 450-51.

universal research, use of books and journals and to ascertain in many local situation the general use of books and journals."

## PRITCHARD[3]

"Application of mathematical methods to books and other media of communication."

## D.T. HAWKINS[4]

"The quantitative analysis of the bibliographic features of a body of literature."

## R.A.FAIRTHORNE[5]

"Quantitative treatment of the properties of recorded discourse and behaviour appertaining to it."

## W.G. POTTER[6]

"The study and measurement of the publication pattern of all forms of written communication and their authorship."

## I.N. SENGUPTA[7]

"Organization classification and quantitative evaluation of publication patterns of all macro communication along with their authorship by mathematical and statistical calculus."

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[3] PRITCHARD (A) Statistical Bibliography on Bibliometric *Journal of Documentation* 25, 1989 348-49
[4] HAWKINS (DT) Unconventional use of online information retrieval system Online Bibliometrics studies *Journal of American Society* 28 (1), 1977, 13-18
[5] FAIRTHORNE (RA) Empirical hyperbolic distribution (Bradford, Zipf Mandellbeit) Bibliometrics description and predictions *Journal of Documentation* 25, 1969, 319
[6] POTTER (WG) Introduction to Bibliometrics *Library Trends*, 30, 1981, 151
[7] SENGUPTA (IN) Bibliometrics A bird's eye view *IASLIC Bulletin* 30 (4) 1985, 167-174

## BRITISH STANDARD INSTITUTE (BSI)[8]

"The study of the use of documents and patterns of publication in which mathematical and statistical methods have been applied."

These definitions show that bibliometrics aims at the examination of the statistical distribution of the process relating to:

i) The utilization of documents.

ii) Library staff, and

iii) Library users.

It helps to evaluate information process and information handling in libraries and information centers.

## 4. GENESIS OF BIBLIOMETRICS

The Term Bibliometrics has a very recent origin. It has emerged as thrust area of research involving different branches of human knowledge.

The first study concerned with bibiometrics was conducted by 'Cole' and 'Eale' in 1917. They wrote "The History of Comparative Anatomy; Part I: A Statistical Analysis". So the term for the first time used as 'Statistical Analysis.'

Hulme was the first to use the expression 'Statistical Bibliography' in 1923 and later it was used by many others. According to him, "The purpose of Statistical Bibliography is to shed light on the process of written communication and of the nature and course of development of a discipline

[8] BRITISH STANDARDS INSTITUTION *British standard of documentation terms,* 1976, BSI, London, p7

by means of counting and analyzing its various facets of written communication.

Henkle (1938) Gosnell (1934-44) Barker (1966) also used the same term i.e. "Statistical Bibliography" in 1968. A. Pritichared analyzed the term with statistics and Bibliography on statistics. Therefore he coined another term called 'Bibliometrics'. Hence the term Bibliometrics has a very recent origin. Pritchard suggested the word 'Bibliometrics' in 1969 in preference to Statistical Bibliography.

## 5. SOME ANALOGOUS TERMS

Bibliometrics is just one of the many science whose name ends with "metrics" Many scientists have used the term under different names, but the concept were more or less same. Some well established sub disciplines like, Librametrics, Scientometrics, Informetrics and Web metrics etc. give some broader and narrower extension of human ideas.

## 5.1 LIBRAMETRICS

The term "Librametry" historically appeared first in 1948. It was suggested by great Indian library scientist Dr. S.R. Ranganathan. Under this term he suggested using of mathematical and statistical method for analyzing library activities and library resources. But this term did not take its place in library science and was forgotten for many years., Later it was called 'Librametrics'

## 5.2 SCIENTOMETRICS

The term 'Scientometrics' suggested by two Russians named V.Nalimov and Z. Mulchinko in their book entitled "Scientometrics: the investigation of science as development of information process" in 1969.

According to them Scientometics is a complex of quantitative methods, which are used to investigate the process of science.

Scientometrics is a new emerging discipline which uses bibliometric measurement for evaluation of factors like scientific progress, levels of scientific development, social relevance and impact of the application of science and technology on society.

## 5.3 INFORMETRICS

The FID's term 'Informetrics' was suggested by German scientist Blackert and S.Z. Zygel in 1979 as a newly formed branch of science using mathematical and statistical methods to investigate scientific and technical information on theoretical level and practical activities.

## 5.4 WEBOMETRICS OR CYBERMETRICS

Recently a new growth area in bibliometrics has been in the emerging field of Webometrics or Cyber metrics as it is often called. Webometrics can be defined as using of bibliometrics techniques in order to study relationship of different sites on World Wide Web (WWW), such techniques may also be used to map out (called "Scientific Mapping" in the traditional bibliometrics research area of the web) some other well established sub disciplines like, Econometrics Psychometrics Sociometrics and Biometrics etc.

# 6. SCOPE AND PURPOSE OF BIBLIOMERTRICS

The scope of Bibliometrics includes the studying of relationship within a literature of describing a literature statistics. Bibliometrics studies are generally based on quantitative evaluation. They are therefore considered only as partial indicators of scientific progress.

1. It sheds light on the progress of written communication on the nature and course of development communication by a descriptive means of counting and analyzing the various facets of written communication.

2. It provides information about the structure of knowledge and how it is communicated.

3. The scope of Bibliometrics includes studying the relationship with a literature (citation studies)or describing a literature typically, these descriptions focus on consistent patterns, involving authors, monographs, journals or subject/language.

4. It is a quantitative science and it is divided into two basic categories.

   (a) Descriptive Bibliometrics (**Productivity count)**

   (i) Geographic

   (ii) Time Period

   (iii) Disciplines

(b) Evaluative Bibliometrics **(Literature usage count)**

   (i) Reference count

   (ii) Citation count

The descriptive bibliometrics further includes the study of the number of publication in a given field or Bibliometrics productivity of literature in the field for the purpose of comparing the amount of production during different periods or the amount produced in different subdivisions of the field. This kind of study is made by a count of the papers, books and other

writings in the field or often by a count of these writings which have been abstracted in specialized abstracting journals.

## 7. SUBDIVISIONS OF BIBLIOMETRICS

- Operation Research (Linear Programming, Transport Problems)
- Statistics (Multivariable techniques, trends, correlation)
- Bibliometrics Laws (Laws of Zipf, Lotka and Bradford)
- Citation Analysis (Networks, Science Policy)
- Circulation theory (Models)
- Information theory
- Theoretical aspects of Information and retrieval.

## 8. BIBLIOMETRICS IN RESEARCH

At present it is an established technique covering wide area of knowledge which provides the background for more practical task. It has therefore, been able to involve scholars from many of these disciplines. Consequently, it has attracted scholars from different disciplines or their respective fields. Day by day, it is attaining sophistication and complexity having national international and inter disciplinary character. It has established itself as viable and distinctive research techniques for studying science of science based on bibliographic data. As a matter of sound theoretical foundation most efficiently and effectively laid by some pioneers like Gross,Lotka, Bradford, Zipf, Derek de J solla, Price, Bookstein, Massavesik, Cole and Eale, Pritchard, Garfield, Hulme Fairthorne and many others who are all not basically librarians, but belong to different branches of knowledge.

The techniques evolved by these pioneers are capable of throwing light or various complicated problems faced by many while handling information to quantify the process of written communication. It has established itself as a viable and distinctive measurement of human knowledge. Data analysis both of citations and of volumes of publications year by year can be useful in planning of retrospective bibliographies.

Bibliometrics also provides information about the structure of knowledge. Its classification studies give information about the subject language and country relationship, which is based on literary warrant. Bibliometrics is very useful in any field of research or in any discipline or it can be used in small and manageable ways by individuals, to improve some part of library or information service.

## 9. BIBLIOMETRICS LAWS

As Bibliometrics law evolved a series of laws have developed within an academic discipline. These laws help researcher to study some common activity Examples of activities would be the use of library materials author productivity or the dispersal of articles, on a particular subject. Some of the more well known laws are Bradford's, Lotka's and Zipf's law. These are the fundamental laws which are as follows:

## 9.1 BRADFORD'S LAW OF SCATTERING OF SCIENTIFIC PAPERS

Samuel C.Bradford[9] first formulated his law in 1932 but did not receive wide attention until the publication of his book 'Documentation in

[9] BRADFORD (SC) Science of Information on specific subject *Engineering* 137, 1934, 85-86

1948. He, while searching for papers in Applied Geophysics and on Lubrication, noticed the scattering of papers among the scientific journals sharing a common pattern.

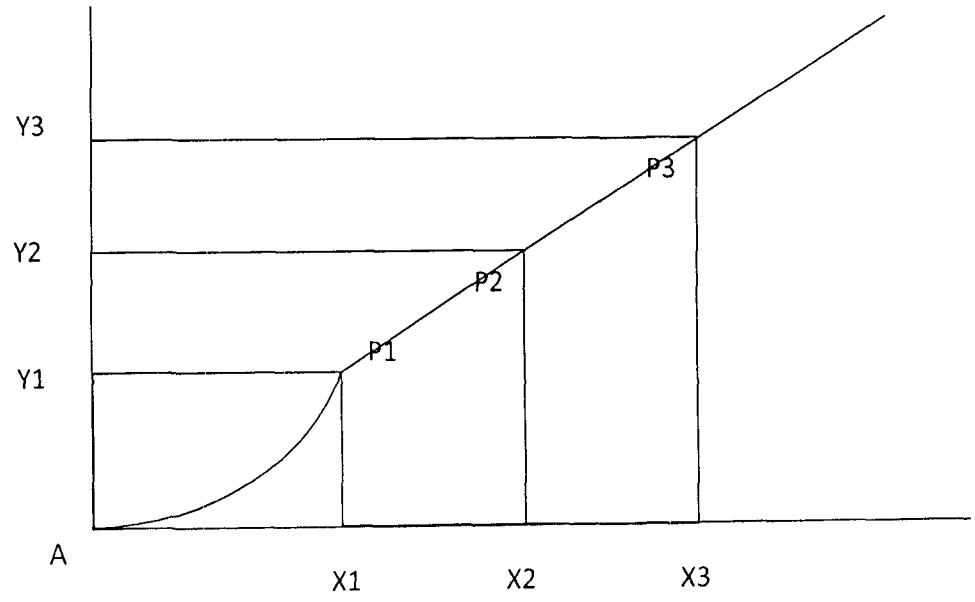
He described it as "if scientific periodicals are arranged in order of decreasing productivity of articles on a given subject that may be divided into a nucleus of periodicals more particularly devoted to the subject and several groups or zones containing the same number of article as the nucleus and succeeding zones will be as:

1 : n : n2

(where n = multiplier)

Bradford also plotted graph of the cumulative number of source items R(n) versus the logarithm values of the cumulative number of journals (log n).

Such a graph is sometimes, called as 'Bradford's Bibliograph':




log (n)

Diagram 1.1

The graph being as a rising curve API, and then continues as straight line. The rising part of the graph represents the nucleus of highly productive journal. The point P1, P2 and P3 on the bibliography are the bounderies of three equi-productive zones in which the same number of articles as the nucleus derived from an increasingly larger number of journals.

## 9.1.1 APPLICATION OF BRADFORD'S LAW

Bradford's law has been shown to be applicable to bibliographies as well as to larger aggregates of literature. The law has been applied to studies of dispersion of literature mostly in the field of science engineering and medicine. Most of these are citation studies which consist of journals titles on the basis of frequency of citation made of those titles in published literature.

Ranked list of journals can be uased as a tools in the development and management of journals collections in libraries.

Studies on the scattering of literature enable designers and managers of libraries and information centers to ensure the following type of questions.

i) What would be the cost of collecting all the journals relevant to a given topic?

ii) What fraction of the total coverage would be available at any specified limit of cost.

iii) What is the optimum distribution of journal collections as between central reference point and satellite development or regional collections?

iv) How can a given collection best be subdivided into collection of primary, secondary, and tertiary relevance or into stores requiring frequent, occasional or only rare cases?

## 9.2 ZIPF'S LAW OF WORD OCCURRENCE

It relates to the frequency of word occurrence. Zipf derived his law from the empirical law of least effort. He said that here is relationship between the rank of a word and its frequency of textual matter if the words are arranged in their decreasing order of frequency of occurrence in a long text.

This law states that, "in a long textual matter if the words are arranged in their decreasing order of frequency then the rank of any given word of the text will be in inversely proportional to the frequency of occurrence of the words."[10]

If 'r' is the rank of a word and 'f' is its frequency then mathematically Zipf's law can be stated as follows.

$$R \propto (1/f) \Rightarrow rf = C, \text{ is a constant}$$

He found that by multiplying the numerical value of each rank® by its corresponding frequency (f) be obtained a product (c) that is constant throughout its text e.g.

[10] ZIPF'S (GK). Human behaviour and the principles of the least efforts: an introduction to human ecology 1949. *Mass edition Wesely.*

**Table 1.1**

**RANKING OF WORD OCCURRENCE**

| Rank (r) | Frequency (f) | Products (c) |
|---|---|---|
| 1 | 400 | 400 |
| 2 | 200 | 400 |
| 3 | 133 | 399 |
| 4 | 100 | 400 |
| 5 | 80 | 400 |

The above table shows distribution of word inversely proportional to the frequency of occurrence of the word.

## 9.3 LOTKA'S LAW OF INVERSE SQUARE OF SCIENTIFIC PRODUCTIVITY

Alfred J.Lotka was a mathematician supervisor of mathematical research in the statistical Bureau of the Metropolitan Life Insurance Company from 1924 to 1933. It was during this time 1926 that his definitive work later called Lotka's law was produced. His investigation was a productivity analysis counting name and number of publication listed for each, the coverage was for only A and B named in Chemical Abstracts for 1907 to 1916 and for Averbach's Geschichtajelh der physik from it beginning through 1900. The data were tabulated and plotted, from which Lotka developed a "general formula for the relation between the frequency 'y' of persons making x contributions"

As $x^2 y$ = constant

In 1926, Alfred J Lotka,[10] statician in an insurance company proposed his "Inverse Square Law" correlating contributors of scientific papers to their number of contributions. He claims that, "a large number of the literature is produced by a small number of authors and it is distributed so as the number of authors productivity n paper is approximately proportional to $1/n^2$

Author ($1/n^2$)

(where n is the number of contributions on articles)

For this, he analyzed the decimal index of Chemical Abstracts from 1907-1916. He collected 6891 names of the authors contributing 1, 2, 3, etc. entries in literature.

On the basis of this data, Lotka deduced a general equation, for the relation between the frequency 'y' of persons making 'x' contributions as follows:

$$X^n y = \text{constant}$$

*If n=2 then, the result as follows.*

In the case examined if found that number of persons making 2 contributions is about one fourth of those making one contribution the number making 'n' contributions is about $1/n^2$ of those making one and the population of all contributions is about 60%.

In other words, for every 100 authors contributing one article, about 11 will contribute 3 articles and 6 will contribute 4 articles and so on. The observed figure for single articles author was 57.09% for Chemical Abstract data (6891 contribution) and 59.2% for physical data (1,352 contributions).

LOTKA (AJ). The frequency of distribution of scientific productivity *Journal of Washington Academy of science*, 16; 1926; 317

Though the law was based on the study of Chemistry and Physics literature, later it generated much interest and attracted the attention of researchers and it has been applied and tested in many other fields.

**Table 1.2**

**RANKING OF AUTHORS**

| No. of Authors | No. of Articles |
|---|---|
| 100 | 1 |
| 25 | 2 |
| 11 | 3 |
| 6 | 4 |
| 4 | 5 |

## OTHER LAWS

The three other important laws that need to be mentioned here are:

### 9.4.1 PRICE'S SQUARE ROOT LAW OF SCIENTIFIC PRODUCTIVITY

Derek J De Solla Price gave this law in 1963. According to this law "Half of the scientific papers are contributed by the square root of the total number of scientific authors."

### 9.4.2 GARFIELD'S LAW OF CONCENTRATION

Eugene Garfield enunciated this law in 1971. This law states, that "A basic concentration of journals is the common core of nucleus of all fields."

### 9.4.3 SENGUPTA'S LAW OF BIBLIOMETRICS

Sengupta has put this law in 1973 which is also known as off setting weightage formula for re-ranking periodicals to avoid discrimination against new journals, which necessarily an extension of the Bradford's law.

It states that "during phase of rapid growth of knowledge in a scientific discipline, articles of interest to that discipline appear in increasing number of periodicals distant from the field."

Mathematically this law stands in the following form:

$F(x+y) = a+b \log (x+y)$

Where f (x+y) is the cumulative number of references in the first (x+y) most productive journals, x indicate number of journals in the same discipline and y stands for number of journals of unrelated discipline (y>x) and a and b are two constants.

## 10. APPLICATIONS OF BIBLIOMETRICS

Now a days Bibliometrics are being applied to get factual and accurate data in the transfer and handling of information According to Narin and Moll, " The most active area of modern bibliometric is concerned with citation." Gross and Gross were the first to apply bibliometric techniques to the problem of Chemical library acquisition.

As bibliometrics lies between the border areas of social sciences and physical sciences; its techniques have extensive applications equally in sociological studies of science, information management, librarianship, history of science and also in some other branches of social sciences and sciences.

Some of the area where bibliometrics techniques can be used are:

- To identify research trends and growth of knowledge.
- To estimate comprehensiveness of secondary periodicals.
- To identify users of different subjects.
- To identify authorship and its trends in documents on various subjects.
- To measure the usefulness of adhoc and retrospective SDI services.
- To forecast past, present and future publishing trends
- To develop experimental models correlating existing ones.
- To identify core periodicals in different discipline.
- To formulate an accurate need based acquisition policy within the limited budgetary provision.
- To adopt an accurate weeding and stacking policy.
- To initiate effective multi level network system.
- To study obsolescence and dispersion of scientific literature (clustering and coupling of scientific papers).
- To predict productivity of publishers, individual author, organization, country or that of an entire discipline.

- To design automatic language processing for auto-indexing, and abstracting and auto-classification; and
- To develop norms for standardization,

## 11. LIMITATIONS

Undoubtedly, that bibliometrics studies are very much helpful in achieving better services do library and information users and efficiency in information system and services management envisioned in Ranganathan's five laws of Lirary Science.

But inspite of that, there are some limitation of bibliometrics laws. Though most of the studies tend to support the Bradford's distribution some other research could not get the satisfactory results. Gross found that research papers among physics journal deviated from, that predicated by Bradiford's law. Out of 50 bibliographics studied by Chonez, only six followed the law, the calls the law pseudo-scientific.

In the case of Lotka's law it was found to fit in most cases. However the value of indexing was found vary for different groups of scientists.

Another problem with Latka's law is that it totally ignores the potential authors who have not produced any publication so far.

In case of Citation Analysis, the common arguments against it area:

- Practice or citing only to get the favour of the powerful or to oppose others.
- Citation is given just to dress up the paper.
- Variation of citation rate with type of paper and specially.
- Negative citation.

Because of all these limitation the empirical nature of these laws are generally questioned.

## 12. CONCLUSION

Bibliometric analysis has now become a well established part of information research, and quantitative approach to the description of documents and examination of services is gaining ground both in research and practice.

It has emerged as the most active field of library and information science during the past few decades. It is estimated that the literature on this topic occupies more than 25% of the total contribution in library and information science. Citation analysis studies form a major portion of it, pertains to application of bibliometric laws. However, there is a long way to go in achieving perfection in the studies. Even the spread of computer for retrieval, counting and analysis are unilikely to achieve perfection in the studies. This study is merely a method, not a theory. To make it a theory and more useful, researches must concentrate on the casual factors underlying Bibliometrics phenomena. The changes that are frequently occupying in the publication practices are likely to complicate the studies in future. In such circumstances it is advisable to consider the results of such studies as more of guidelines rather than ends of themselves.

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# Chapter -2

# Osteoporosis

# CHAPTER-2

# OSTEOPOROSIS

## 0. INTRODUCTION

Osteoporosis, or porous bone is a disease characterized by low bone mass, and structural deterioration of bone tissue, leading to bone fragility and an increased risk of fractures the hip, spine and wrist.

In Osteoporosis the **Bone Mineral Density (BMD)** is reduced, bone micro architecture is disrupted, and the amount and variety of proteins in bone is altered.

Women as well as men are affected by osteoporosis, a disease that can be prevented and treated

## 1. OSTEOPOROSIS: Meaning and Definition

Osteoporosis is resection in bone tissue mass causing weakness of skeletal strength (Greek. *Osteon* = bone, *poros* = pore, *osis* = condition). It results from excessive resorption of calcium and phosphorus from the bone. There is relatively greater loss of trabecular bone than of compact bone. This leads to vertical compression, or crush fracture, of the vertebrae (which consist primarily of trabecular bone), and fracture of the neck of the femur (which has considerable trabecular bone).

Osteoporosis is defined by the **World Health Organization (WHO)** in women as a bone mineral density 2.5 standard deviations below peak

bone mass (20-year old healthy female average) as measured by DXA, the term "established osteoporosis" includes the presence of fragility fracture.

## 2. FACTS AND FIGURES

- Osteoporosis is a major public health threat for 44 miillion Americans, 68 percent of whom are women.
- In the United States today, 10 million individuals already have Osteoporosis and 34 million more have low bone mass, placing them at increased risk for this disease.
- One out of every two women and one in four men age 50 and older will have an osteoporosis related fracture in their life time.
- More than 2 million American men suffer from Osteoporosis and millions more are at risk. Each year, 80,000 men have a hip fracture and one third of these men die within a year.
- Osteoporosis can strike at any age.
- Osteoporosis is responsible for more than 1.5 million fractures annually including approximately 300,000 hip fractures, 700,000 vertebral fractures, 250,000 wrist fractures and more than 300,000 fractures at other sites.
- Based on figures from hospitals and nursing homes, the estimated national direct expenditures for osteoporosis and related fractures total $ 14 billion each year.

## 3. SYMPTOMS

Osteoporosis is called **"silent disease"** because bone is lost with no signs. There are no symptoms in the early stages of the disease.

Symptoms occurring late in the disease include:

- Bone pain or tenderness
- Fractures with little or no trauma
- Loss of height (as much as 6 inches) over time.
- Low back pain due to fractures of the spinal bones.
- Neck pain due to fractures of the spinal bones.
- Stooped posture of kyphosis, also called a "dowager's hump."

## 4. RISK FACTORS

Certain risk factors are linked to the development of osteoporosis and contribute to an individuals likelihood of developing the disease. Many people with osteoporosis have several risk factors, but others who develop the disease have no known risk factors. Some risk factors cannot be changed, but you can change others.

*Risk factors you cannot change include:*

- **Gender:** Women get osteoporosis more often than men.
- **Age:** The older you are, the greater your risk of osteoporosis
- **Body size:** Small thin-boned women are at greater risk.
- **Ethnicity:** White and Asian women are at highest risk. Black and Hispanic women have a lower risk.
- **Family History:** osteoporosis tends to run in families. If a family member has osteoporosis or breaks a bone there is a greater chance that you will too.

**Other Risk Factors Are**

- **Sex hormones:** Low estrogen levels due to missing menstrual periods or to menopause can cause osteoporosis in women low testosterone level can bring on osteoporosis in men.
- **Anorexia nervosa:** This eating disorder can lead to osteoporosis.
- **Calcium and vitamin D intake:** A diet low in calcium and vitamin D makes you more prone to bone loss.
- **Medication use:** Long-term use of glucocorticoids and some anticonvulsants can lead to loss of bone density and fractures.
- **Life style:** An inactive lifestyle or extended bed rest tends to weaken bones.
- **Smoking:** smoking is bad for bones as well as the heart and lungs.
- **Alcohol intake:** Excessive consumption of alcohol increases the risk of bone loss and fractures.

## 5. TREATMENT

The goals of osteoporosis treatment are to:

- Control pain from the disease
- Slow down or stop bone loss
- Prevent bone fractures with medicines that strengthen bone
- Minimize the risk of falls that might cause fractures

Several medications are available for the prevention and treatment of osteoporosis:

## 5.1 BISPHOSPHONATES

Bisphophonates are the primary drugs used to both prevent and treat osteoporosis in postmenopausal women.

- Bisphosphonates taken by mouth include alendronate (fosamax), ibandronate (Boniva), and risedronate (Actonel). Most are taken by mouth usually once a week or once a month.
- Bisphosphonates given through a vein (intravenously) are taken less often.

## 5.2 CALCITONIN

Calcitonin is a medicine that slows the rate of bone loss and relieves bone pain. It comes as a nasal spray or injection. The main side effects are nasal irritation from the spray form and nausea from the injectable form.

Calcitonin appears to be less effective that bisphosphonates.

## 5.3 HORMONE REPLACEMENT THERAPY

Estrogen or Hormone Replacement Therapy (HRT) is rarely used anymore to prevent osteoporosis, and are not approved to treat a woman who has already been diagnosed with the condition

Sometimes, if estrogen has helped a woman and she can not take other options for preventing treating osteoporosis, the doctor may recommend that she continue using hormone therapy.

## 5.4 PARATHYROID HORMONE

Teriparatide (Forteo) is approved for the treatment of postmenopausal women who have severe osteoporosis and are considered at high risk for fractures. The medicine is given through daily shots underneath the skin

## 5.5 RALOXIFENE

Raloxifene (Evista ) is used for the prevention and treatment of osteoporosis Raloxifene is similar to breast cancer drug tamoxifen Raloxifene can reduce the risk of spinal fractures by almost 50%.

The most serious side effect of raloxifene is a very small risk of blood clots in the leg veins (deep venous thrombosis) or in the lungs (pulmonary embolus).

## 5.6 EXERCISE

Regular exercise can reduce the likelihood of bone fractures in people with osteoporosis. Some of the recommended exercise include:

- Weight-bearing exercise –walking, jogging, playing tennis, dancing
- Resistance exercise – free weights, weight machines, stretch bands.
- Balance exercise - tai chi, yoga.
- Riding a stationary bicycle.
- Using rowing machines

Avoid any exercise that presents a risk falling, or high - impact exercise that may cause fractures.

## 5.7 DIET

Get at least 1,200 milligrams (mg) per day of calcium and 800 – 1,000 international unit (IU) of vitamin D3. Vitamin D helps our body absorb calcium. Doctor may recommend a supplement to give the calcium and vitamin D you need.

Follow a diet that provides the proper amount of calcium vitamin D and protein. While this will not completely stop bone loss, it will guarantee that a supply of the materials the body uses to form and maintain bones is available.

High calcium foods include:

- Cheese
- Ice cream
- Leafy green vagetables, such as spinach and collard greens
- Low-fat milk
- Salmon
- Sardines (with the bones)
- Tofu
- Yogurt

## 5.8 STOP UNHEALTHY HABITS

Smoking is bad for bones as well as heart .and lung. Women who smoke have lower levels of estrogen compared with nonsmokers and they often go through menopause earlier. Smokers also may absorb less calcium from their diets.

Regular consumption of 2 to 3 ounces a day of alcohol may be damaging to the skeleton even in young women and men. Those who drink having are more prone to bone loss and fracture because of both poor nutrition and increased risk of falling.

### 5.9 PREVENT FALLS

It is critical to prevent falls. Avoid sedating medications and remove household hazards to reduce the risk of fractures. Make sure your vision is good. Other ways to prevent falling include:

- Avoiding walking alone on icy days.
- Using bars in the bath tub, when needed.
- Wearing well fitting shoes.

### 5.10 RELATED SURGERIES

There are no surgeries for treating osteoporosis itself However a procedure called vertebroplasty can be used to treat any small fractures in spinal column due to osteoporosis. It can also help prevent weak vertebra from becoming fractured by strengthening the bones in spinal column.

The procedure involves injecting a fast hardening glue into the areas that are fractured or weak. A similar procedure called kyphoplasty uses balloons to widen the spaces that need the glue (The balloons are removed during the procedure)

## 6. PREVENTION

Calcium is essential for building and maintaining healthy bone Vitamin D is also needed because it helps body absorb calcium. Following a

healthy well balanced diet can help get these and other important nutrients throughout life.

Other tips for prevention:

- Avoid drinking excess alcohol
- Don't smoke
- Get regular exercise.

## 7. CONCLUSION

Osteoporosis is the most common type of bone disease. The loss of bone occurs "silently" and progressively. Medications to treat osteoporosis can help prevent fractures but vertebrae that have already collapsed cannot be reversed.

The good news is that osteoporosis is now a largely treatable condition and with a combination of life style changes and appropriate medical treatment many fractures can be avoided. Osteoporosis is debilitating, it does not affect life expectancy.

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# Chapter -3

# Bibliometric study: Scope, Objectives and Methodology

# CHAPTER -3

# BIBLIOMETRIC STUDY: SCOPE, OBJECTIVES AND METHODOLOGY

## 0. INTRODUCTION

Bibliometrics is a quantitative study based on statistical and mathematical methods. This study is helpful in management of scientific literature measuring the utility of periods and relationship between journals and subject area and also in knowing the most productive contributors in a given field. Due to interdisciplinary nature of research and trends towards specialization, librarians and information scientists are facing great problems in acquisition, organization and dissemination of information. Therefore, to eliminate these problems. There is need of such types of study i.e. bibliometric study.

## 1. SCOPE

Literature on "**Osteoporosis**" during 2002-2004: A Bibliometric study. So far no study on this specific subject. The author has been chosen the year 2002-04, due to the availability of *Index Medicus* in the printed form. This *Index Medicus* is available in the **Library of Jawahar Lal Nehru Medical College, Aligarh.**

## 2. OBJECTIVES

The present study aims at identification and describing some of the characteristic of the literature published in the field "Osteoporosis" over the period of 2002 years, 2003 to 2004 with a view to identify the place, year, language, subject area, forms of documents, county of origin where the document is published.

More precisely the main objectives of the present study are:

(a) To know the eminent authors in the field of "Osteoporosis"

(b) To prepare a ranked list of journals and to find out the core journals in the field of "Osteoporosis".

(c) To know the most productive country in the field of "Osteoporosis".

(d) To know the most common form of document in given literature.

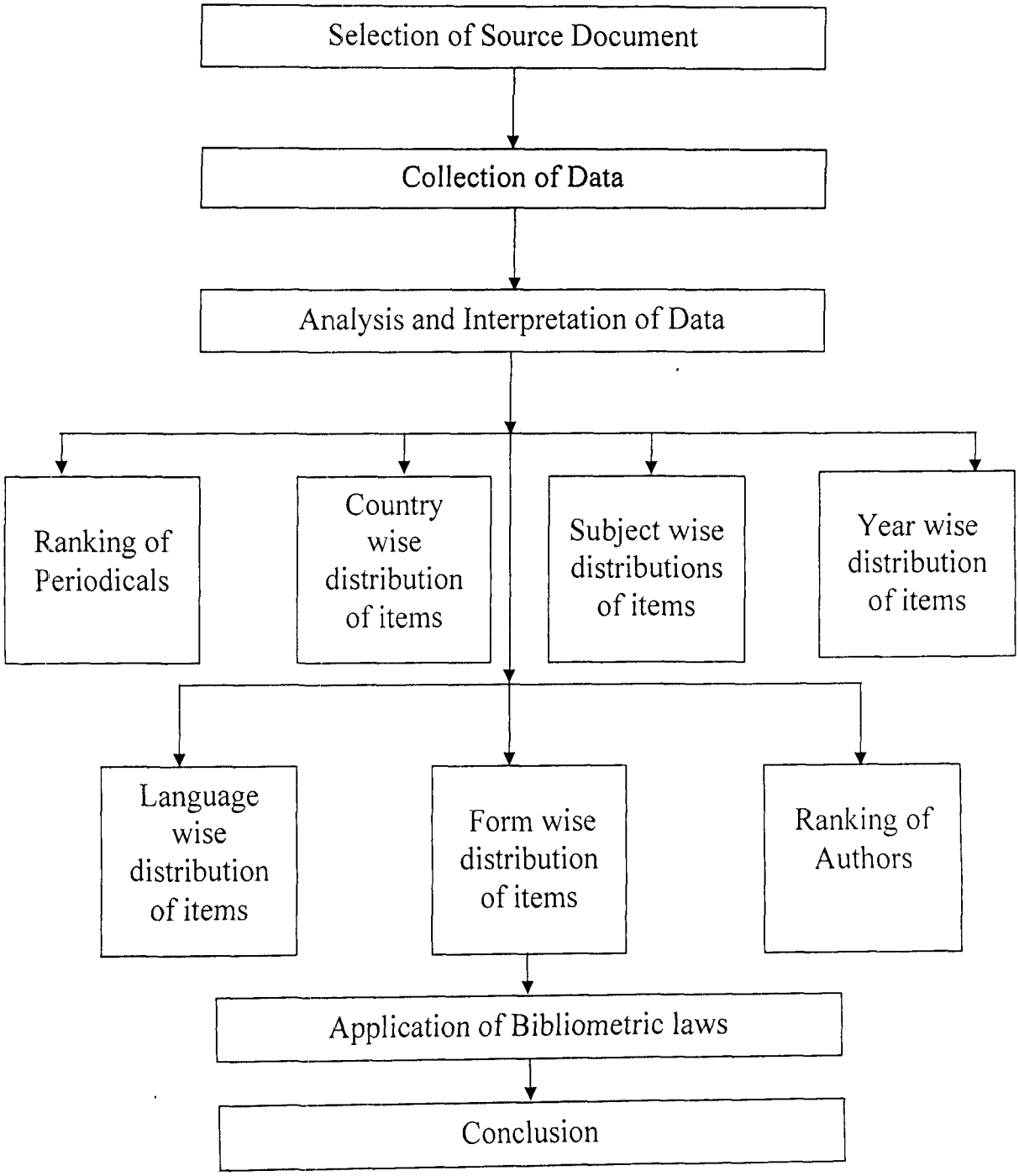
(e) To known the language(s) in which the most of literature on the subject has been published.

(f) To know the rate of collaborations research.

(g) To find out the chronological distribution of items.

## 3. METHODOLOGY

The methodology of Bibliometric can be shown through the following flow chart:



Research in any area calls for systematic methodologies. The methodology for conducting the bibliometric study has been diagrammatically represented below:

## 3.1 Selection of Source Document

The first step in this study is to select the source document from which data is to be collected for this purpose. *Index Medicus* which is published from **National Library of Medicine** (NLM), Washington, U.S.A.

## 3.2 Collection of Data

From the 3 volume of *Index Medicus* i.e., 2002, 2003, 2004 reference on the subject "Osteoporosis" has been collected on 5"×3" catalogue cards. Each contained information about author, title, name of periodical, year, place of publication language and form of document.

## 3.3 Analysis and Interpretation of Data

All 2024 references (card) were arranged and re arranged in order to complete the following studies

### 3.3.1 Ranking of Periodicals

The main objective of this study is to identify the core periodicals containing the research literature on "osteoporosis". For this purpose, a ranked list of periodicals was prepared.

### 3. 3.2 Country Wise Distribution of Items

It is done to identify the place of origin of documents, which is given in *Index Medicus*. The entries were grouped on the basis of their place of origin. They were then counted and worked in a table.

### 3.3.3 Subject Wise Distribution of Items

Though most of the literature on a given subject is published in core journals but sometimes some material of research value is published in the journals belonging to related fields. The information about the subject fields of periodicals was obtained from *Ulrich International Periodicals Directory* (42nd ed; 2004). This analysis idntifies the core subjects as well as related subjects on the **"Osteoporosis"** to be collected. For this purpose, *Index Medicus* has been consulted.

### 3.3.4 Year Wise Distribution

It is useful to know the occurrence of source documents. This type of study reveals the number of works in a particular year in which the most of the study is conducted. For which purpose a table showing year wise distribution has been prepared.

### 3.3.5 Language Wise Distribution

For the purpose of language wise analysis, the entries were grouped according to their language of origin. After this, they were counted and then a ranked list of languages has been prepared.

### 3.3.6 Form Wise Distribution

There are variety of forms of documents like reviews, case study, news letter, bulletin, patents, articles, reports etc. The information regarding the forms was collected from *Index Medicus* tabulated to find out the most dominant form of literature

### 3.3.7 Ranking of Authors

It is done to know the most productive contributors in the subject. For the purpose of ranking of authors the information about all the authors was retrieved, arranged and tabulated in the order of decreasing frequency of their contribution.

## 4. APPLICATION OF BIBLIOMETRIC LAWS

The whole study depends upon the application of biblimetric laws such as **Lotka, Bradford** and **Zipf's laws**. These laws were applied to the analyzed data to check their validity.

## 5. CONCLUSION

The last step of this study is to conclude the findings of the study.

# Chapter -4

# Data Analysis, Interpretation and Presentation

# CHAPTER 4

# DATA ANALYSIS, INTERPRETATION AND PRESENTATION

Three volume of ***Index Medicus*** for the year **2002-2004** were consulted for collecting the required data on the topic **'Osteoporosis'.** These three volumes carried **2024** items on the subject. The data, so collected was analyzed as under:

## 4.1 RANKING OF PERIODICALS

As the periodicals are important source of current information, they play a vital role in scientific communication. The periodicals that contribute most of the literature in a given field are called core journals. Identification of core journals in the subject under study will be useful from the point of view of scientists and librarians alike.

The main aim of the present study is to identify the most important journals containing most of the literature of research value in the filed of 'Osteoporosis'. This information of core journals in various subjects will go a long way in preparing the subscription list of periodicals by libraries. This information is useful for the information scientists as well.

In the collected data, all the 2024 references were found to be published in 486 periodicals, which have been ranked up to 23

position. However, table 4.1 lists shows only 285 periodicals which the frequency of occurrence of items is upto 2. The periodicals with less than 2 items have not been considered. Table 4.1 shows that the first rank was occupied by the journal titled **"Osteoporos Int."** which accounts for **13.09%** of the total references. Next 3 position are occupied by journals like **'Nippon Rinsho' (6.02%), J Bone Miner Res (3.66%)** and **Bone (2.62%)** respectively.

Table 4.1 and 4.1.1 shows that most of the literature on 'Osteoporosis' appear in 4 periodicals as total umber of items 521 constituting 25.74% of the total appeared in those periodicals. They may be regarded as core journals in the field 'Osteoporosis'.

The journals having their frequency of occurrence in the range 60-265 is 4, those range 11-35 is 20, in range of 7-10 is 29, and those in range of 5-6 is 41.

The present ranking list may be useful for the libraries in taking policy decisions regarding the subscription list of periodicals on the subject 'Osteoporosis' and related diseases. It will be equally important for the documentalists in preparing an exhaustive documentation list. The study may be useful for the scientists, as they would know the core journals caring the highest percentage of items.

## Table 4.1

## RANKING OF PERIODICAL

| S.No | Rank | Name of Periodicals | Place | Freq. | %age |
|---|---|---|---|---|---|
| 1 | 1 | Osteoporos Int. | England | 265 | 13.09 |
| 2 | 2 | Nippon Rinsho | Japan | 122 | 6.02 |
| 3 | 3 | J Bone Miner Res | U.S. | 74 | 3.65 |
| 4 | 4 | Bone | U.S. | 60 | 2.96 |
| 5 | 5 | Calcif Tissue Int. | U.S | 35 | 1.72 |
| 6 | 6 | J Clin Densitom | U.S. | 34 | 1.67 |
| 7 | 6 | J Clin Endocrinol Metab | U.S | 34 | 1.67 |
| 8 | 7 | J Bone Miner Metab | Japan | 32 | 1.58 |
| 9 | 8 | J Rheumatol | Canada | 19 | 0.93 |
| 10 | 9 | Arch Intern Med | U.S. | 18 | 0.88 |
| 11. | 10 | Front Horm Res | Switzerland | 17 | 0.83 |
| 12. | 11 | MMW Fortschr Med | Germany | 15 | 0.74 |
| 13 | 11 | South Med J | U.S. | 15 | 0.74 |
| 14 | 12 | Ann Acad Med Singapore | Singapore | 14 | 0.69 |
| 15 | 12 | Dtsch Med Wochenschr | Germany | 14 | 0.69 |
| 16 | 12 | Rheumatology (Oxford) | England | 14 | 0.69 |
| 17 | 13 | Curr Opin Rheumatol | U.S | 12 | 0.59 |
| 18 | 13 | Med Clin (Barc) | Spain | 12 | 0.59 |
| 19 | 13 | Nippon Ronen Igakkai Zasshi | Japan | 12 | 0.59 |
| 20 | 13 | Proc Nutr Soc. | England | 12 | 0.59 |
| 21 | 13 | Ugeskr Laeger | Denmark | 12 | 0.59 |
| 22 | 14 | Endocrinol Metab Clin North Am | U.S | 11 | 0.54 |
| 23 | 14 | Spine | U.S. | 11 | 0.54 |

| | | | | | |
|---|---|---|---|---|---|
| 24 | 14 | Zhongguo Zhong Xi Yi Jie He Za Zhi | China | 11 | 0.54 |
| 25 | 15 | Arthritis Rheum | U.S. | 10 | 0.49 |
| 26 | 15 | Aust Fam Physician | Australia | 10 | 0.49 |
| 27 | 15 | Curr Rheumatol Rep | U.S | 10 | 0.49 |
| 28 | 15 | J Endocrinol Invest | Italy | 10 | 0.49 |
| 29 | 15 | Lancet | England | 10 | 0.49 |
| 30 | 16 | Ann Rheum Dis | England | 09 | 0.44 |
| 31 | 16 | Instr Course Lect | U.S | 09 | 0.44 |
| 32 | 16 | J Urol | U.S. | 09 | 0.44 |
| 33. | 16 | N Engl J Med | U.S. | 09 | 0.44 |
| 34 | 17 | An Sist Sanit Navar | Spain | 08 | 0.39 |
| 35 | 17 | Clin Exp Rheumatol | Italy | 08 | 0.39 |
| 36 | 17 | Clin Geriatr Med | U.S | 08 | 0.39 |
| 37 | 17 | Duodecim | Finland | 08 | 0.39 |
| 38 | 17 | Eur Spine J | Germany | 08 | 0.39 |
| 39 | 17 | Gut | England | 08 | 0.39 |
| 40 | 17 | J Bone Joint Surg Am | U.S | 08 | 0.39 |
| 41 | 17 | J Orthop Sci | Japan | 08 | 0.39 |
| 42 | 17 | Radiology | U.S | 07 | 0.34 |
| 43 | 18 | Am J Med | U.S | 07 | 0.34 |
| 44 | 18 | Clin Orthop | U.S | 07 | 0.34 |
| 45 | 18 | Clin Rheumatol | Germany | 07 | 0.34 |
| 46 | 18 | Curr Pharm Des | Netherlands | 07 | 0.34 |
| 47 | 18 | J neurosurg | U.S | 07 | 0.34 |
| 48 | 18 | Joint Bone Spine | France | 07 | 0.34 |
| 49 | 18 | Mayo Clin Proc | U.S | 07 | 0.34 |
| 50 | 18 | Med J Aust | Australia | 07 | 0.34 |

| | | | | | |
|---|---|---|---|---|---|
| 51 | 18 | Ned Tijdschr Geneeskd | Netherlands | 07 | 0.34 |
| 52 | 18 | Orthopade | Germany | 07 | 0.34 |
| 53 | 18 | Rev Med Suisse Romande | Switzerland | 07 | 0.34 |
| 54 | 19 | Am J Clin Nutr | U.S | 06 | 0.29 |
| 55 | 19 | Ann Pharmacother | U.S | 06 | 0.29 |
| 56 | 19 | Ann Univ Mariae Curie Sklodowska[Med] | U.S | 06 | 0.29 |
| 57 | 19 | Endocr Pract | U.S | 06 | 0.29 |
| 58 | 19 | Eur J Gastroenterol Hepatol | England | 06 | 0.29 |
| 59 | 19 | Expert Opin Pharmacother | England | 06 | 0.29 |
| 60 | 19 | Hunan Yi Ke Da Xue Xue Bao | China | 06 | 0.29 |
| 61 | 19 | Intern Med J | Australia | 06 | 0.29 |
| 62 | 19 | J Am Geriatr Soc | England | 06 | 0.29 |
| 63 | 19 | J Pediatr Endocrinol Metab | England | 06 | 0.29 |
| 64 | 19 | J Women Health (Larchmt) | U.S | 06 | 0.29 |
| 65 | 19 | Lakartidningen | Sweden | 06 | 0.29 |
| 66 | 19 | Lupus | England | 06 | 0.29 |
| 67 | 19 | Maturitas | Ireland | 06 | 0.29 |
| 68 | 19 | Oncology (Huntingt) | U.S | 06 | 0.29 |
| 69 | 19 | Pol Arch Med Wewn | Poland | 06 | 0.29 |
| 70 | 19 | Postgrad Med J | England | 06 | 0.29 |
| 71 | 19 | Rheumatol Int | Germany | 06 | 0.29 |
| 72 | 19 | Sheng Wu Yi Xue Gong Cheng Xue Za Zhi | China | 06 | 0.29 |
| 73 | 20 | Am J Gastroenterol | U.S | 05 | 0.24 |
| 74 | 20 | Ann Intern Med | U.S | 05 | 0.24 |
| 75 | 20 | Cancer | U.S | 05 | 0.24 |

| | | | | | |
|---|---|---|---|---|---|
| 76 | 20 | Can Fam Physician | Canada | 05 | 0.24 |
| 77 | 20 | Cleve Clin J Med | U.S | 05 | 0.24 |
| 78 | 20 | Clin Ther | U.S | 05 | 0.24 |
| 79 | 20 | CMAJ | Canada | 05 | 0.24 |
| 80 | 20 | Epilepsy Behav | U.S | 05 | 0.24 |
| 81 | 20 | Exp Clin Endocrinol Diabetes | Germany | 05 | 0.24 |
| 82 | 20 | Hosp Med | England | 05 | 0.24 |
| 83 | 20 | Injury | Netherlands | 05 | 0.24 |
| 84 | 20 | J Am Diet Assoc | U.S | 05 | 0.24 |
| 85 | 20 | J Pediatr | U.S | 05 | 0.24 |
| 86 | 20 | J Reprod Med | U.S | 05 | 0.24 |
| 87 | 20 | Med Pediatr Oncol | U.S | 05 | 0.24 |
| 88 | 20 | Orv Hetil | Hungary | 05 | 0.24 |
| 89 | 20 | Radiologe | Germany | 05 | 0.24 |
| 90 | 20 | Rev Endocr Metab Disord | U.S. | 05 | 0.24 |
| 91 | 20 | Semin Musculoskelet Readiol | U.S. | 05 | 0.24 |
| 92 | 20 | Spine J | US | 05 | 0.24 |
| 93 | 20 | Ter Arkh | Russia | 05 | 0.24 |
| 94 | 20 | Unfallchirurg | Germany | 05 | 0.24 |
| 95 | 21 | Aging Clin Exp Res | Italy | 04 | 0.19 |
| 96 | 21 | Am Fam Physician | U.S | 04 | 0.19 |
| 97 | 21 | Am J Epidemiol | U.S. | 04 | 0.19 |
| 98 | 21 | Arch Pediatr | France | 04 | 0.19 |
| 99 | 21 | Clin Endocrinol (Oxford) | England | 04 | 0.19 |
| 100 | 21 | Clin Pediatr (Phila) | U.S. | 04 | 0.19 |
| 101 | 21 | Di Yi Jun Yi Da Xue Xue Bao | China | 04 | 0.19 |
| 102 | 21 | JAMA | U.S. | 04 | 0.19 |
| 103 | 21 | J Am Coll Nutr | U.S. | 04 | 0.19 |

| 104 | 21 | J Intern Med | England | 04 | 0.19 |
|---|---|---|---|---|---|
| 105 | 21 | J Orthop Trauma | U.S. | 04 | 0.19 |
| 106 | 21 | Med Klin | Germany | 04 | 0.19 |
| 107 | 21 | Nefrologia | Spain | 04 | 0.19 |
| 108 | 21 | Nippon Eiseigaku Zasshi | Japan | 04 | 0.19 |
| 109 | 21 | Nippon Naika Gakkai Zasshi | Japan | 04 | 0.19 |
| 110 | 21 | Pharm Unserer Zeit | Germany | 04 | 0.19 |
| 111 | 21 | Pol Merkuriusz Lek | Poland | 04 | 0.19 |
| 112 | 21 | Postgrad Med | U.S. | 04 | 0.19 |
| 113 | 21 | Przegl Lek | Poland | 04 | 0.19 |
| 114 | 21 | QJM | England | 04 | 0.19 |
| 115 | 21 | Radiol Med (Torino) | Italy | 04 | 0.19 |
| 116 | 21 | Rev Med Interne | France | 04 | 0.19 |
| 117 | 21 | Schweiz Rundsch Med Prax | Switzerland | 04 | 0.19 |
| 118 | 21 | Transplantation | U.S | 04 | 0.19 |
| 119 | 21 | Trends Endocrinol Metab | U.S. | 04 | 0.19 |
| 120 | 21 | Wien Klin Wochenschr | Austria | 04 | 0.19 |
| 121 | 21 | Z Gastroenterol | Germany | 04 | 0.19 |
| 122 | 21 | Zhongguo Zhong Ya Za Zhi | China | 04 | 0.19 |
| 123 | 21 | Z Rheumatol | Germany | 04 | 0.19 |
| 124 | 22 | Acad Radiol | U.S. | 03 | 0.14 |
| 125 | 22 | AJNR Am J Neuroradiol | U.S. | 03 | 0.14 |
| 126 | 22 | An NY Acad Sci | U.S. | 03 | 0.14 |
| 127 | 22 | Aten Primaria | Spain | 03 | 0.14 |
| 128 | 22 | BMJ | England | 03 | 0.14 |
| 129 | 22 | Br J Radiol | England | 03 | 0.14 |
| 130 | 22 | Can J Surg | Canada | 03 | 0.14 |
| 131 | 22 | Chest | U.S. | 03 | 0.14 |

| | | | | | |
|---|---|---|---|---|---|
| 132 | 22 | Chin J Traumatol | China | 03 | 0.14 |
| 133 | 22 | Chin Med J (Engl) | China | 03 | 0.14 |
| 134 | 22 | Clin Obstet Gynecol | U.S | 03 | 0.14 |
| 135 | 22 | Conn Med | U.S. | 03 | 0.14 |
| 136 | 22 | Curr Opin Pharmacol | England | 03 | 0.14 |
| 137 | 22 | Drugs | New Zealand | 03 | 0.14 |
| 138 | 22 | Drugs Toay (Barc) | U.S | 03 | 0.14 |
| 139 | 22 | Endocrine | U.S. | 03 | 0.14 |
| 140 | 22 | Eur J Endocrinol | England | 03 | 0.14 |
| 141 | 22 | Gastroenterology | U.S. | 03 | 0.14 |
| 142 | 22 | Gerentology | Switzerland | 03 | 0.14 |
| 143 | 22 | Ginekol Pol | Poland | 03 | 0.14 |
| 144 | 22 | Horm Res | Switzerland | 03 | 0.14 |
| 145 | 22 | Int J Eat Disord | U.S. | 03 | 0.14 |
| 146 | 22 | Int J Technol Assess Health Care | England | 03 | 0.14 |
| 147 | 22 | Isr Med Assoc J | Israel | 03 | 0.14 |
| 148 | 22 | J Anat | England | 03 | 0.14 |
| 149 | 22 | J Bone Joint Surg Br | England | 03 | 0.14 |
| 150 | 22 | J Clin Invest | U.S | 03 | 0.14 |
| 151 | 22 | J Gastroenterol Hepatol | Australia | 03 | 0.14 |
| 152 | 22 | J Hepatol | England | 03 | 0.14 |
| 153 | 22 | J Rheumatol Suppl. | Canada | 03 | 0.14 |
| 154 | 22 | J Steroid Biochem Mol Biol | England | 03 | 0.14 |
| 155 | 22 | Knee | Netherlands | 03 | 0.14 |
| 156 | 22 | Klin Med (Mosk) | Russia | 03 | 0.14 |
| 157 | 22 | Medicina (Kaunas) | Lithuania | | 0.14 |

| | | | | | |
|---|---|---|---|---|---|
| 158 | 22 | Metabolism | U.S. | 03 | 0.14 |
| 159 | 22 | Nippon Yakurigaku Zasshi | Japan | 03 | 0.14 |
| 160 | 22 | Presse Med | France | 03 | 0.14 |
| 161 | 22 | Prev Med | France | 03 | 0.14 |
| 162 | 22 | Ryoikibetsu Shokogun Shirizu | Japan | 03 | 0.14 |
| 163 | 22 | Scan J Gastroenterol | England | 03 | 0.14 |
| 164 | 22 | Scan J Surg | Finland | 03 | 0.14 |
| 165 | 22 | Semin Arthritis Rheum | U.S | 03 | 0.14 |
| 166 | 22 | Top Magn Reson Imaging | U.S. | 03 | 0.14 |
| 167 | 22 | Urol Clin North Am | U.S. | 03 | 0.14 |
| 168 | 22 | Urol Oncol | U.S. | 03 | 0.14 |
| 169 | 22 | Vnitr Lek | Czech Republic | 03 | 0.14 |
| 170 | 22 | WMJ | U.S. | 03 | 0.14 |
| 171 | 22 | Zhonghua Yi Xue Za Zhi | China | 03 | 0.14 |
| 172 | 22 | Zhong Yao Cai | China | 03 | 0.14 |
| 173 | 23 | Acta Med Austriaca | Austria | 02 | 0.09 |
| 174 | 23 | Acta Orthop Belg | Belgium | 02 | 0.09 |
| 175 | 23 | Age Ageing | England | 02 | 0.09 |
| 176 | 23 | Akush Ginekl (Sofiia) | Bulgaria | 02 | 0.09 |
| 177 | 23 | Am J Health Behav | U.S. | 02 | 0.09 |
| 178 | 23 | Am J Human Biol | U.S. | 02 | 0.09 |
| 179 | 23 | Am J Kidney Dis | U.S. | 02 | 0.09 |
| 180 | 23 | Am J Med Sci | U.S. | 02 | 0.09 |
| 181 | 23 | Am, J Nurse | U.S. | 02 | 0.09 |
| 182 | 23 | Ann J Orthop | U.S. | 02 | 0.09 |
| 183 | 23 | Ann Acad Med Stetin | Poland | 02 | 0.09 |

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|---|---|---|---|---|---|
| 184 | 23 | Ann Biol Clin (Paris) | France | 02 | 0.09 |
| 185 | 23 | Ann Chir Gynecal | Finland | 02 | 0.09 |
| 186 | 23 | Ann Clin Biochem | England | 02 | 0.09 |
| 187 | 23 | Ann Endocrinol (Paris) | France | 02 | 0.09 |
| 188 | 23 | Basic Clin Pharmacol Toxicol | Denmark | 02 | 0.09 |
| 189 | 23 | Biochem Biophys Res Commun. | U.S. | 02 | 0.09 |
| 190 | 23 | Biol Pharm Bull | Japan | 02 | 0.09 |
| 191 | 23 | Biomed Mater Eng | Netherlands | 02 | 0.09 |
| 192 | 23 | Biosci Biotechnol Biochem | Japan | 02 | 0.09 |
| 193 | 23 | BMC Genet | England | 02 | 0.09 |
| 194 | 23 | BMC Musculoskelet Disord | England | 02 | 0.09 |
| 195 | 23 | Br J Hematol | England | 02 | 0.09 |
| 196 | 23 | Br Poult sci | England | 02 | 0.09 |
| 197 | 23 | Bull Exp Biol Med | U.S. | 02 | 0.09 |
| 198 | 23 | Bull Hosp Jt Dis | U.S | 02 | 0.09 |
| 199 | 23 | Can J Public Health | Canada | 02 | 0.09 |
| 200 | 23 | Clin Dymorphol | England | 02 | 0.09 |
| 201 | 23 | Clin Liver Dis | U.S | 02 | 0.09 |
| 202 | 23 | Clin Med | England | 02 | 0.09 |
| 203 | 23 | Clin Nucl Med | U.S | 02 | 0.09 |
| 204 | 23 | Clin Prostate Cancer | U.S. | 02 | 0.09 |
| 205 | 23 | Curr Gastroenterol Rep | U.S. | 02 | 0.09 |
| 206 | 23 | Curr Opin Nephrol Hypertens | England | 02 | 0.09 |
| 207 | 23 | Curr Opin Obstet Gynecol | England | 02 | 0.09 |
| 208 | 23 | Curr Womens Health Rep | U.S | 02 | 0.09 |
| 209 | 23 | Dig Dis Sci | U.S. | 02 | 0.09 |
| 210 | 23 | Drugs Aging | New | 02 | 0.09 |

| | | | | | |
|---|---|---|---|---|---|
| | | | Zealand | | |
| 211 | 23 | East Mediterr Health J | Egypt | 02 | 0.09 |
| 212 | 23 | Endocrinology | U.S. | 02 | 0.09 |
| 213 | 23 | Epilepsia | U.S. | 02 | 0.09 |
| 214 | 23 | Eur J Cin Nutr | England | 02 | 0.09 |
| 215 | 23 | Eur Radiol | Germany | 02 | 0.09 |
| 216 | 23 | Expert Opin Ther Targets | England | 02 | 0.09 |
| 217 | 23 | Gastroenterol Clin Biol | France | 02 | 0.09 |
| 218 | 23 | Growth Horm IGF Res | Scotland | 02 | 0.09 |
| 219 | 23 | Harefuah | Israel | 02 | 0.09 |
| 220 | 23 | Histol Histopathol | Spain | 02 | 0.09 |
| 221 | 23 | Hua Xi Yi Ke Da Xue Xue Bao | China | 02 | 0.09 |
| 222 | 23 | Indian J Expo Biol | India | 02 | 0.09 |
| 223 | 23 | Indian Pediatr | India | 02 | 0.09 |
| 224 | 23 | Int J Clin Pharmacol | Switzerland | 02 | 0.09 |
| 225 | 23 | Int J Clin Pract | England | 02 | 0.09 |
| 226 | 23 | Int Orthod | U.S. | 02 | 0.09 |
| 227 | 23 | Invest Radiol | U.S. | 02 | 0.09 |
| 228 | 23 | Ir Med J | Ireland | 02 | 0.09 |
| 229 | 23 | J Acquire Immune Defic | U.S. | 02 | 0.09 |
| 230 | 23 | J Am Geriatr | U.S. | 02 | 0.09 |
| 231 | 23 | J Am Pharm Assoc (Wash) | U.S. | 02 | 0.09 |
| 232 | 23 | J Am Soc Ne[phrol | U.S. | 02 | 0.09 |
| 233 | 23 | J Appl Physiol | U.S. | 02 | 0.09 |
| 234 | 23 | J Assoc Physician India | India | 02 | 0.09 |
| 235 | 23 | J Cell Biochem | U.S. | 02 | 0.09 |
| 236 | 23 | J Community Health | Netherlands | 02 | 0.09 |

| | | | | | |
|---|---|---|---|---|---|
| 237 | 23 | J Endocrinol | England | 02 | 0.09 |
| 238 | 23 | J Fam Pract | US | 02 | 0.09 |
| 239 | 23 | J Hum Genet | Japan | 02 | 0.09 |
| 240 | 23 | J Nutr. | U.S. | 02 | 0.09 |
| 241 | 23 | J Orthop | US | 02 | 0.09 |
| 242 | 23 | J Orthop Sports Phys Ther | US | 02 | 0.09 |
| 243 | 23 | J Pediatr Adolesc Gynecol | US | 02 | 0.09 |
| 244 | 23 | J Spinal Disord Tech | U.S | 02 | 0.09 |
| 245 | 23 | J Trauma | U.S. | 02 | 0.09 |
| 246 | 23 | J Women Aging | England | 02 | 0.09 |
| 247 | 23 | Kidney Int | U.S. | 02 | 0.09 |
| 248 | 23 | Kidney Int Suppl | U.S. | 02 | 0.09 |
| 249 | 23 | Lik Sprava | Ukraine | 02 | 0.09 |
| 250 | 23 | Liver Teranspl. | U.S. | 02 | 0.09 |
| 251 | 23 | Med Eng Phys | England | 02 | 0.09 |
| 252 | 23 | Med Health RI | U.S. | 02 | 0.09 |
| 253 | 23 | Med Monatsschr Pharma | Germany | 02 | 0.09 |
| 254 | 23 | Med Sci Sport Exerc | U.S. | 02 | 0.09 |
| 255 | 23 | Mod Med | U.S. | 02 | 0.09 |
| 256 | 23 | Neurology | U.S | 02 | 0.09 |
| 257 | 23 | Nutr Hosp | Spain | 02 | 0.09 |
| 258 | 23 | Nutrition | U.S. | 02 | 0.09 |
| 259 | 23 | Orthop Clin North Am | U.S | 02 | 0.09 |
| 260 | 23 | Phytother Res | England | 02 | 0.09 |
| 261 | 23 | Planta Med | Germany | 02 | 0.09 |
| 262 | 23 | Prog Urol | France | 02 | 0.09 |
| 263 | 23 | Psychiatry Res | Ireland | 02 | 0.09 |
| 264 | 23 | Psychol Rep | U.S. | 02 | 0.09 |

| | | | | | |
|---|---|---|---|---|---|
| 265 | 23 | Public Health Nurt | England | 02 | 0.09 |
| 266 | 23 | Recenti Prog Med | Italy | 02 | 0.09 |
| 267 | 23 | Reumatizam | Croatia | 02 | 0.09 |
| 268 | 23 | Rev Assoc Med Bras | Brazil | 02 | 0.09 |
| 269 | 23 | Rev Clin Esp | Spain | 02 | 0.09 |
| 270 | 23 | Rev Mal Respir | France | 02 | 0.09 |
| 271 | 23 | Saudi Med J | Saudi Arabia | 02 | 0.09 |
| 272 | 23 | Skeletal Radiol | Germany | 02 | 0.09 |
| 273 | 23 | Tidsskr Nor Laegeforen | Norway | 02 | 0.09 |
| 274 | 23 | Transplant Proc | U.S. | 02 | 0.09 |
| 275 | 23 | Ultrasound Med Biol | England | 02 | 0.09 |
| 276 | 23 | Urology | U.S. | 02 | 0.09 |
| 277 | 23 | Vestn Rentgenol Radiol | Russia | 02 | 0.09 |
| 278 | 23 | Vestn Ross Akad Med Nauk | Russia | 02 | 0.09 |
| 279 | 23 | Vet J | England | 02 | 0.09 |
| 280 | 23 | Wei Shen Yan Jiu | China | 02 | 0.09 |
| 281 | 23 | Wiad Lek | Poland | 02 | 0.09 |
| 282 | 23 | World Rev Nutr Diet | Switzerland | 02 | 0.09 |
| 283 | 23 | Yonsei Med J | Korea (South) | 02 | 0.09 |
| 284 | 23 | Zhongguo Yi Xue Ke Xue Yuan Xue Bao | China | 02 | 0.09 |
| 285 | 23 | Zhonghua Kou Qiang Yi Xue Za Zhi | China | 02 | 0.09 |

Table 4.1.1

SHOWING RANGE OF FREQUENCY

| S.No. | Frequency Range | No. of Periodicals | No. of Items | % age | Cumulative % Age |
|---|---|---|---|---|---|
| 1 | 60-265 | 4 | 521 | 25.74 | 25.74 |
| 2 | 11-35 | 20 | 354 | 17.49 | 43.23 |
| 3 | 7-10 | 29 | 235 | 11.61 | 54.84 |
| 4 | 5-6 | 41 | 224 | 11.06 | 65.90 |
| 5 | 3-4 | 78 | 263 | 12.99 | 78.89 |
| 6 | 1-2 | 314 | 427 | 21.09 | 99.98 |
| | **Total** | **486** | **2024** | **99.98** | |

## 4.2 COUNTRY WISE DISTRIBUTION

It is a well known fact that certain countries give more research output in a particular subject than others. The information is very much useful not only for the information managers in finalizing the subscription list of the periodicals but also for the research scholars as they tend to know the countries that are leaders in the field.

Table 4.2 Contains a list of 42 countries producing research material on 'Osteoporosis'. These countries have been ranked on the basis of frequency of occurrence of items. It was observed that **41.69%**of the

total articles were published from **U.S.** only. This is followed by **England, Japan** and **Germany** produce **18.33%, 9.88%** and **5.48%** research items respectively.

The analysis not only shows the most productive countries of research on **'Osteoporosis'** but also indicates the wide coverage of ***Index Medicus***, as a the publications from 42 countries of the world have been listed.

**Table 4.2**

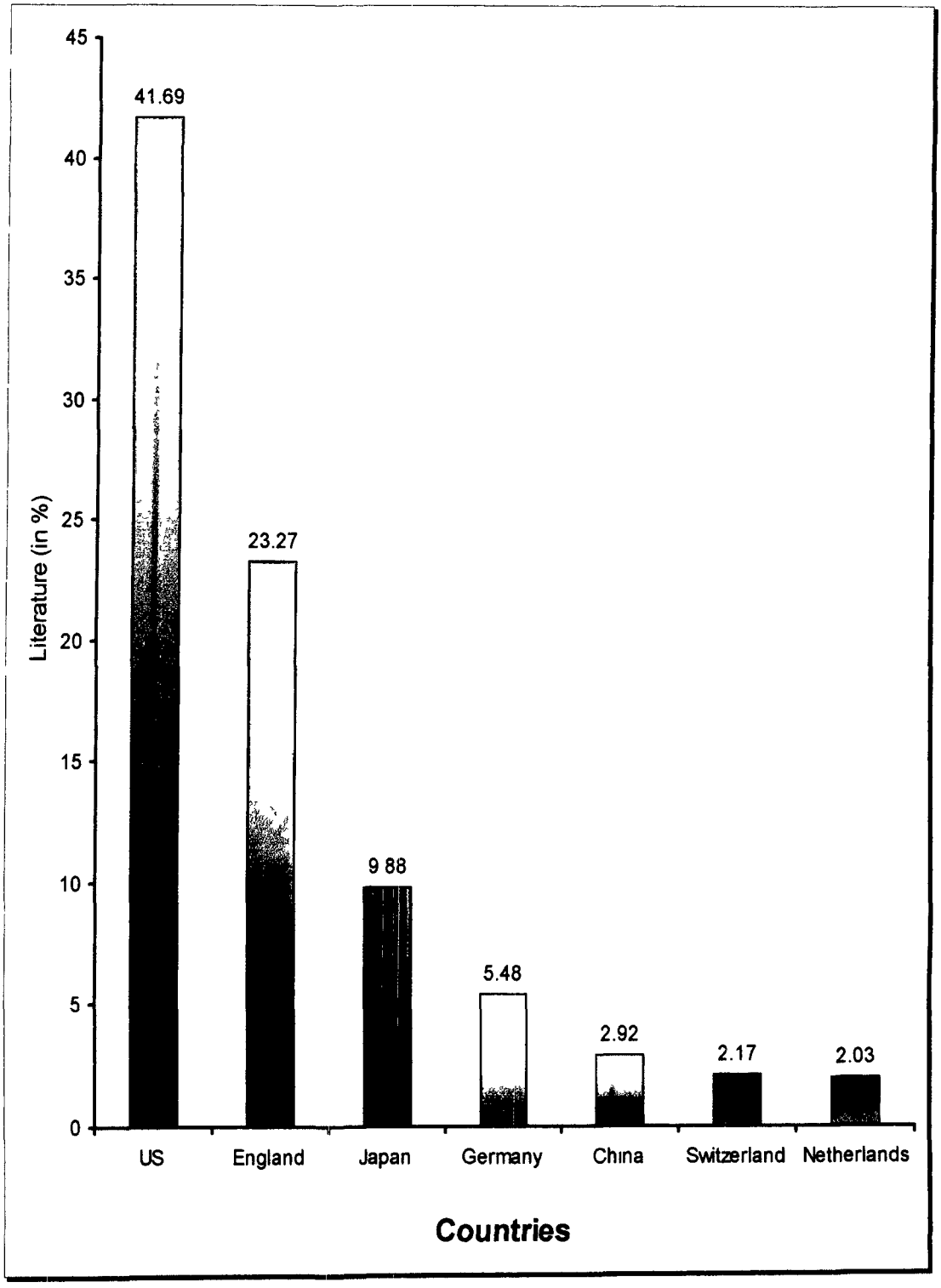
**COUNTRY WISE DISTRIBUTION**

| S.No. | Rank | Name of Country | Frequency of Occurrence | %age |
|---|---|---|---|---|
| 1 | 1 | U.S. | 844 | 41.69 |
| 2 | 2 | England | 471 | 23.27 |
| 3 | 3 | Japan | 200 | 9.88 |
| 4 | 4 | Germany | 111 | 5.48 |
| 5 | 5 | China | 59 | 2.92 |
| 6 | 6 | Switzerland | 44 | 2.17 |
| 7 | 7 | Netherlands | 41 | 2.03 |
| 8 | 8 | Canada | 40 | 1.97 |
| 9 | 9 | Italy | 36 | 1.77 |
| 10 | 10 | Spain | 34 | 1.67 |

| | | | | |
|---|---|---|---|---|
| 11 | 11 | France | 33 | 1.63 |
| 12 | 12 | Poland | 30 | 1.48 |
| 13 | 13 | Australia | 28 | 1.38 |
| 14 | 14 | Denmark | 17 | 0.83 |
| 15 | 14 | Russia | 17 | 0.83 |
| 16 | 15 | Singapore | 15 | 0.74 |
| 17 | 16 | Finland | 13 | 0.64 |
| 18 | 17 | India | 12 | 0.59 |
| 19 | 18 | Ireland | 11 | 0.54 |
| 20 | 19 | Austria | 07 | 0.34 |
| 21 | 19 | Sweden | 07 | 0.34 |
| 22 | 20 | Hungary | 06 | 0.29 |
| 23 | 20 | Israel | 06 | 0.29 |
| 24 | 20 | New Zealand | 06 | 0.29 |
| 25 | 21 | Brazil | 04 | 0.19 |
| 26 | 22 | Czech Republic | 03 | 0.14 |
| 27 | 22 | Korea (South) | 03 | 0.14 |
| 28 | 22 | Lithuania | 03 | 0.14 |
| 29 | 23 | Belgium | 02 | 0.09 |

| | | | | |
|---|---|---|---|---|
| 30 | 23 | Bulgaria | 02 | 0.09 |
| 31 | 23 | Croatia | 02 | 0.09 |
| 32 | 23 | Egypt | 02 | 0.09 |
| 33 | 23 | Norway | 02 | 0.09 |
| 34 | 23 | Saudi Arabia | 02 | 0.09 |
| 35 | 23 | Scotland | 02 | 0.09 |
| 36 | 23 | Ukraine | 02 | 0.09 |
| 37 | 23 | Venezuela | 02 | 0.09 |
| 38 | 24 | Bangladesh | 01 | 0.04 |
| 39 | 27 | Malaysia | 01 | 0.04 |
| 40 | 24 | Pakistan | 01 | 0.04 |
| 41 | 24 | South Africa | 01 | 0.04 |
| 42 | 24 | Turkey | 01 | 0.04 |
| | | **Total** | **2024** | |

## Diagram 4.2: Representing Country wise Literature Output



## 4.3 SUBJECT-WISE DISTRIBUTION

Usually most of the materials on a given subject is published in the journals belonging to same subject. But, a single amount of literature is also published in periodicals of the related subjects.

This analysis has been done on the basis of subject filed of periodicals publishing the literature. ***Ulrich International periodicals Directory*** (42th ed., 2004) has been used to know the subject fields of various periodicals.

Table 4.3 gives a subject wise breakup in the field of osteoporosis, this data show that the highest percentage of document i.e. 526 items containing (25.99%) of the collected data fall under "**Metabolism**", the second, third and fourth position to go Medicine with 478 items (23.62%), **Medical Sciences –Orthopedics** with 14.7% items (7.26%), **Medical Sciences- Endocrinology** with 140 items (6.92%) respectively. The total number of subjects covering the periodicals were 44 in the filed of "**Osteoporosis**". However, only 10 top subjects are given below:

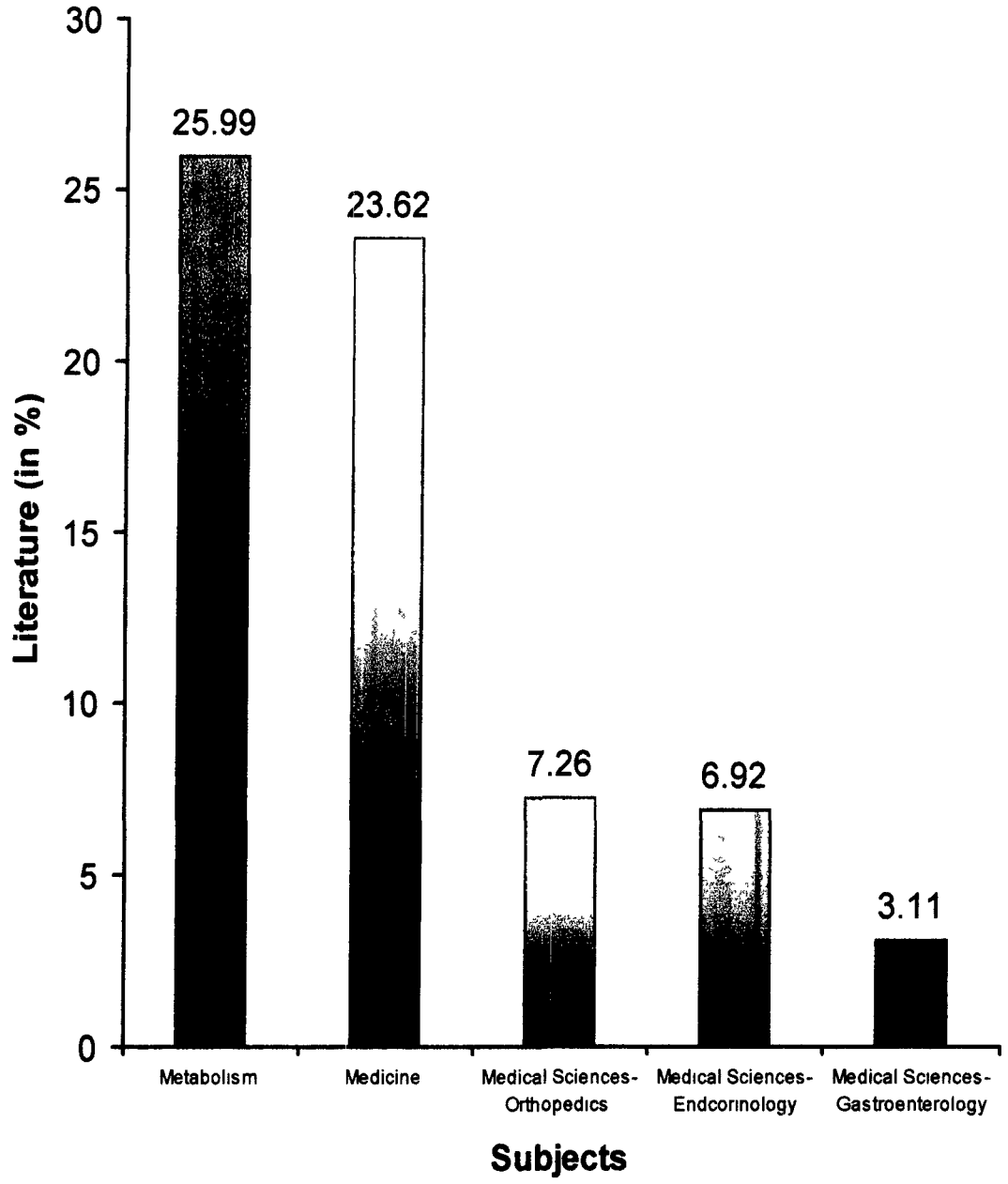
**Table 4.3**

**SUBJECT WISE DISTRIBUTION**

| S.No. | Rank | Subject Area | Frequency | Freq. % age | Cum. Freq. % age |
|---|---|---|---|---|---|
| 1 | 1 | Metabolism | 526 | 25.99 | 25.99 |

| | | | | | |
|---|---|---|---|---|---|
| 2 | 2 | Medicine | 478 | 23.62 | 49.61 |
| 3 | 3 | Medical Sciences - Orthopedics | 147 | 7.26 | 56.87 |
| 4 | 4 | Medical Sciences - Endocrinology | 140 | 6.92 | 63.79 |
| 5 | 5 | Medical Sciences - Gastroenterology | 63 | 3.11 | 66.90 |
| 6 | 6 | Medical Sciences - Internal Medicine | 58 | 2.87 | 69.77 |
| 7 | 7 | Medical Sciences - Geriatrics | 43 | 2.11 | 71.88 |
| 8 | 7 | Nutritional Science | 43 | 2.11 | 73.99 |
| 9 | 7 | Medical Sciences- Pathology | 43 | 2.11 | 76.10 |
| 10 | 8 | Medical Sciences - Urology and Nephrology | 37 | 1.83 | 77.93 |

## Diagram 4.3: Representing Subject Wise Distribution of Items



## 4.4 YEAR WISE DISTRIBUTION

Currency of information is an important factor for any good indexing and abstracting service. The main objective of the chronological study is to find out current information published by ***Index Medicus***. This study is useful in knowing the most productive year of items ranked. Through this study we will be able to know that how many articles are published in which year.

Table 4.4 shows the chronological scattering of all references. It gives the number of items published in the volumes of 2002, 2003 and 2004 in different years.

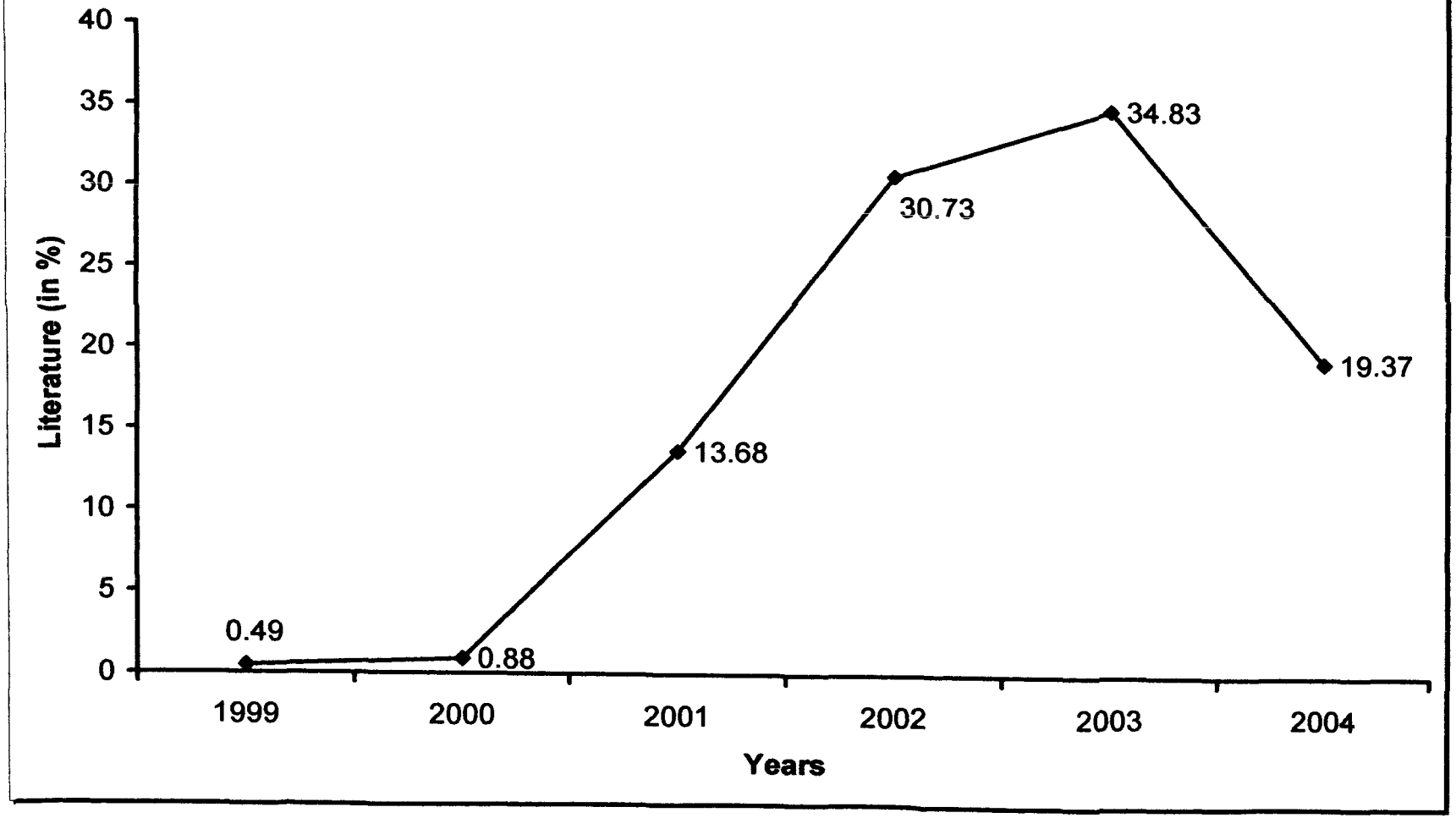
It is to be observed that the total frequency of occurrence of items in the volumes of 2002, 2003, 2004 were 589, 641, 794 respectively. However, the total percentage of the frequency of occurrence of items in three volumes of ***Index Medicus*** was the highest i.e. 34.83% in 2003. This is followed by 2002, 2004, and 2001, with a total percentage of frequency of occurrence as 30.73%, 19.37% and 13.68% respectively. Though the volumes of 2002, 2003, and 2004 contain few references which were published in 1999 and 2000.

## Table 4.4

## YEAR WISE DISTRIBUTION

| S.No. | Period of Origin | Freq. of Occurrence of Items in | | | Total Freq. | % age Freq. | Cum. Freq.% age |
|---|---|---|---|---|---|---|---|
| | | Vol 2002 | Vol 2003 | Vol. 2004 | | | |
| 1. | 1999 | 5 | 4 | 1 | 10 | 0.49 | 0.49 |
| 2. | 2000 | 9 | 6 | 3 | 18 | 0.88 | 1.37 |
| 3. | 2001 | 260 | 15 | 2 | 277 | 13.68 | 15.05 |
| 4. | 2002 | 315 | 285 | 22 | 622 | 30.73 | 45.78 |
| 5. | 2003 | | 331 | 374 | 705 | 34.83 | 80.61 |
| 6. | 2004 | | | 392 | 392 | 19.37 | 99.98 |
| | **Total** | **589** | **641** | **794** | **2024** | **99.98** | |

**Diagram 4.4 : Representing Year Wise Distribution of Items**



## 4.5 LANGUAGE WISE DISTRIBUTION

It is always useful for the researchers and the information scientists to know the language in which material in their area of specialization is published. This type of study provides information about the most dominant language or languages in which the literature on the subject 'Osteoporosis' being produced.

Table 4.5 shows the distribution of items according to the language of their publication. Out of a total of 2024 itmes, 1578 **(77.95%)** were published in **English** language.

The second and third rank occupied by **Japanese** and **German** with 150 **(7.41%)** and 70 **(3.45%)** items respectively. This is followed by **Chinese French, Spanish, Polish** etc.

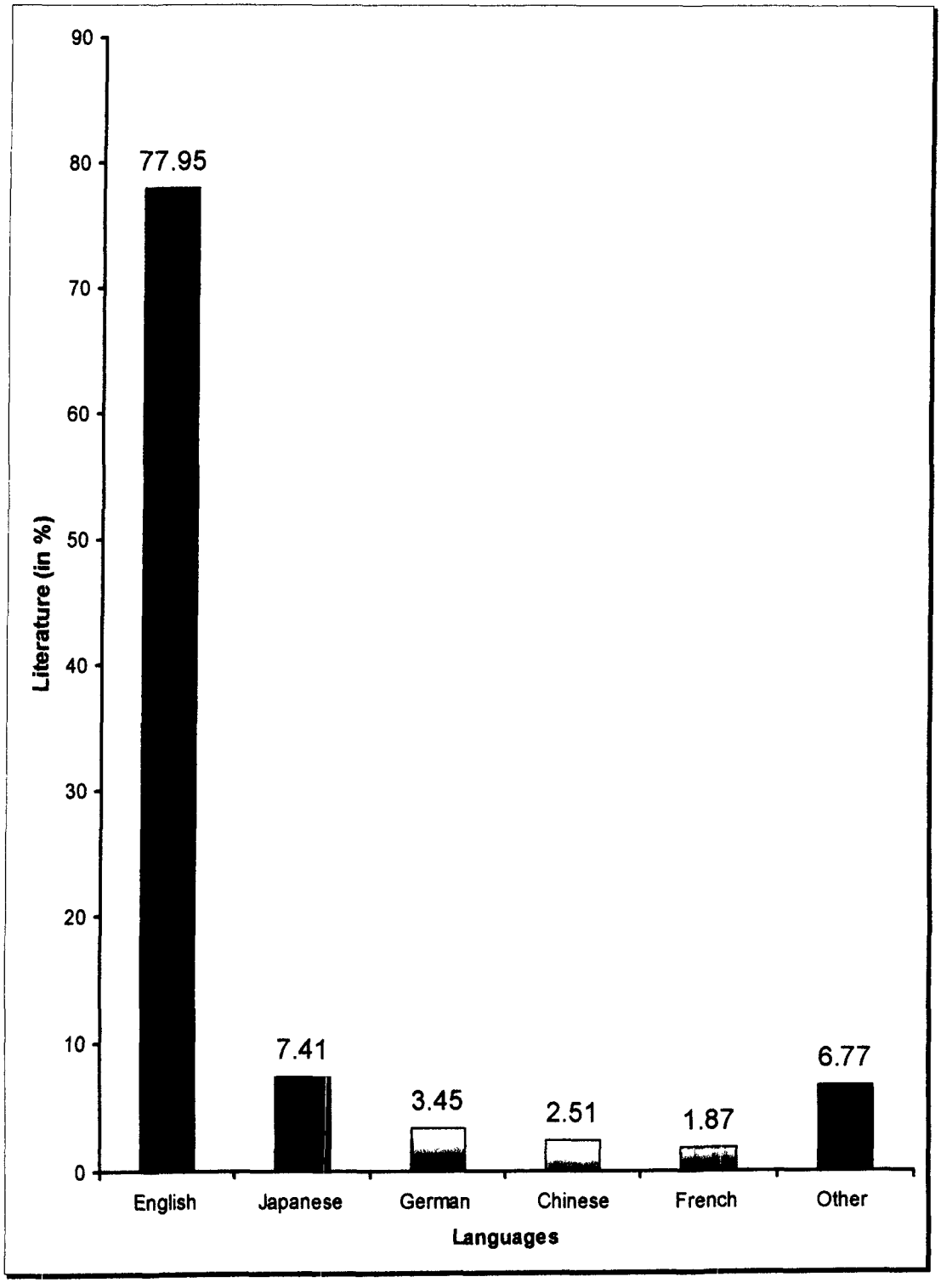
**Table 4.5**

**LANGUAGE WISE DISTRIBUTION**

| S.No. | Rank | Name of Language | Frequency | Freq. %age | Cumulative Freq. (%) |
|---|---|---|---|---|---|
| 1 | 1 | English | 1578 | 77.96 | 77.95 |
| 2 | 2 | Japanese | 150 | 7.41 | 85.37 |
| 3 | 3 | German | 70 | 3.45 | 88.82 |
| 4 | 4 | Chinese | 51 | 2.51 | 91.33 |
| 5 | 5 | French | 38 | 1.87 | 93.20 |

| | | | | | |
|---|---|---|---|---|---|
| 6 | 6 | Spanish | 34 | 1.67 | 94.87 |
| 7 | 7 | Polish | 17 | 0.83 | 95.70 |
| 8 | 8 | Russian | 16 | 0.79 | 96.49 |
| 9 | 9 | Danish | 12 | 0.59 | 97.08 |
| 10 | 10 | Finnish | 08 | 0.39 | 97.47 |
| 11 | 10 | Italian | 08 | 0.39 | 97.86 |
| 12 | 11 | Dutch | 07 | 0.35 | 98.21 |
| 13 | 11 | Swedish | 07 | 0.35 | 98.56 |
| 14 | 12 | Hungarian | 06 | 0.30 | 98.86 |
| 15 | 13 | Portuguese | 04 | 0.20 | 99.06 |
| 16 | 14 | Croatian | 03 | 0.15 | 99.21 |
| 17 | 14 | Czech | 03 | 0.15 | 99.36 |
| 18 | 14 | Lithuanian | 03 | 0.15 | 99.51 |
| 19 | 15 | Bulgarian | 02 | 0.10 | 99.61 |
| 20 | 15 | Hebrew | 02 | 0.10 | 99.71 |
| 21 | 15 | Norwegian | 02 | 0.10 | 99.81 |
| 22 | 15 | Ukrainian | 02 | 0.10 | 99.91 |
| 23 | 16 | Turkish | 01 | 0.05 | 99.96 |
| | | **Total** | **2024** | **99.96** | |

## Diagram 4.5: Representing Language Wise Distribution



## 4. 6 FORM WISE DISTRIBUTION

The literature on the subject 'Osteoporosis' has been published in many different forms such as Articles, letter, news, report, interviews etc. The main objective of this analysis is to know the forms in which the literature on the subject 'Osteoporosis' is being published. This study helps the information scientist/ librarians in knowing the most productive form of literature on the subject.

Analysis of collected data shows that literature on the subject 'Osteoporosis' was published in thirteen different forms as shown in Table 4.6. It is evident from the table that 1816 items constituting **89.72%** of the total data collected was published in the form of periodical **article.** The next three positions were occupied by **letter, editorial, comment** with 100 **(4.94%), 46(2.27%),** 18 **(0.89%)** references respectively. It may be stated that articles published in journals are the most vital media of communication among scientists belonging to the subject **'Osteoporosis'.**

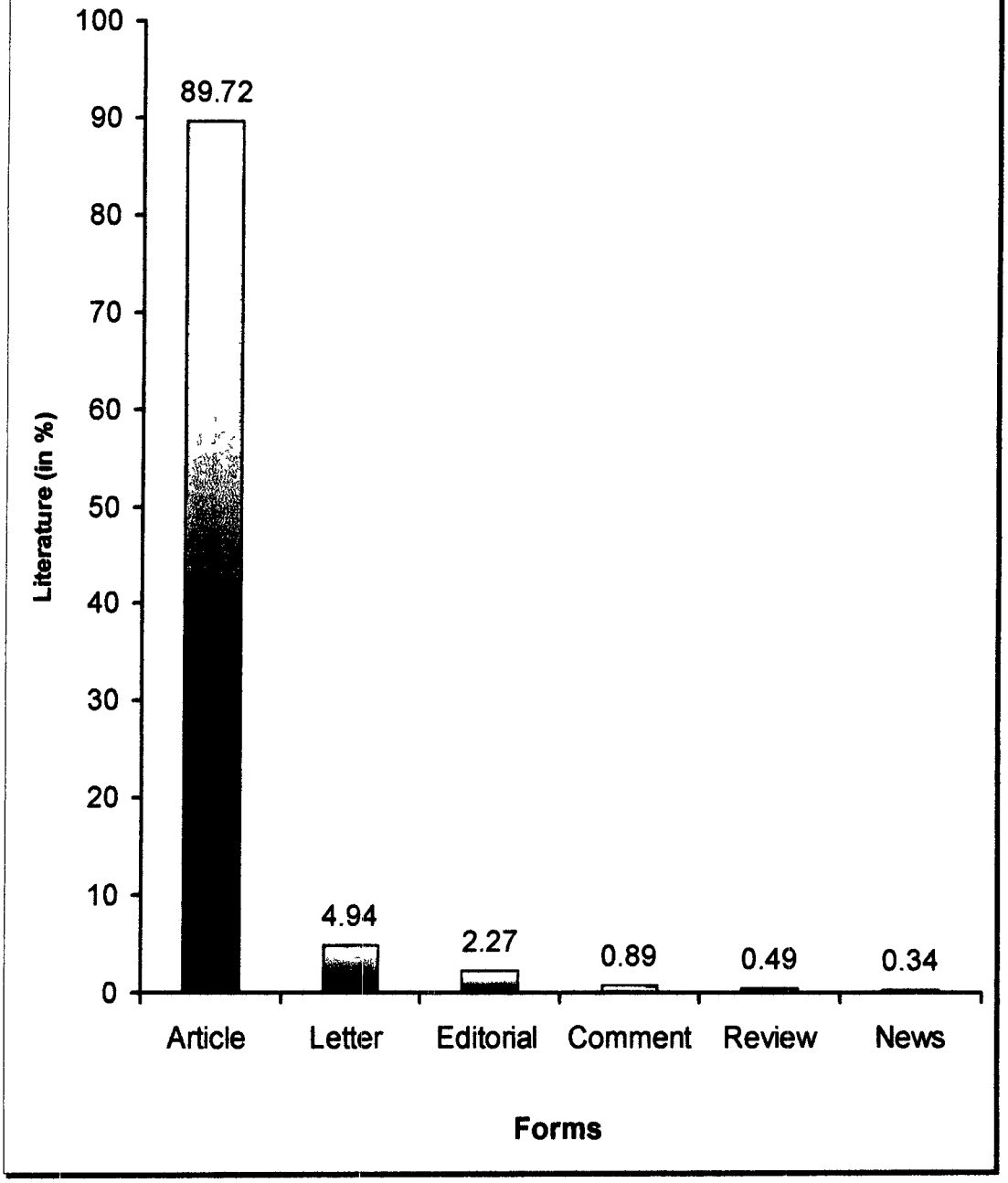
**Table 4.6**

**FORM WISE DISTRIBUTION**

| S.No. | Rank | Forms | Frequency | Frequency % age | Cumm. Freq. %age |
|---|---|---|---|---|---|
| 1 | 1 | Article | 1816 | 89.72 | 89.72 |
| 2 | 2 | Letter | 100 | 4.94 | 94.66 |

| | | | | | |
|---|---|---|---|---|---|
| 3 | 3 | Editorial | 46 | 2.27 | 96.93 |
| 4 | 4 | Comment | 18 | 0.89 | 97.82 |
| 5 | 5 | Review | 10 | 0.49 | 98.31 |
| 6 | 6 | News | 07 | 0.34 | 98.66 |
| 7 | 7 | Author Reply | 06 | 0.30 | 98.96 |
| 8 | 7 | Report | 06 | 0.30 | 99.26 |
| 9 | 8 | Case study | 04 | 0.20 | 99.46 |
| 10 | 8 | Discussion | 04 | 0.20 | 99.66 |
| 11 | 9 | Interview | 03 | 0.14 | 99.80 |
| 12 | 9 | Conference Proceeding | 03 | 0.14 | 99.94 |
| 13 | 10 | Quiz | 01 | 0.05 | 99.99 |
| | | **Total** | **2024** | **99.99** | |

**Diagram 4.6: Representing Form wise Distribution**



## 4.7 RANKING OF AUTHORS

In every subject, there are a number of contributors. However, some of them are well known in a given field. It is therefore, important to know the eminent scientists in the field of "Osteoporosis". This information is equally useful for the librarians and researchers.

Table 4.7 gives the name of authors with their individual contribution (i.e. number of papers). From the analysis it was found that 1338 (66.10%) items were written by single authors and 686 (33.89%) items were written by more then one i.e. multiple authors. This shows the present trend of research in which joint efforts are involved to complete a research work. It may be noted that name for multiple authors were not given for each item in *Index Medicus*.

Although this study is not sufficient to know the major contributors exactly yet the present ranking list may be of considerable help to know the name of significant authors in **'Osteoporosis'** during 2002-2004.

The name of first three most productive authors are:

i) **Kanis, JA (12 items)**

ii) **Ringe, JD (10 items)**

iii) **Minne, HW (09 items)**

## Table 4.7

## RANKING OF AUTHOR

| S.No. | Rank | Name of Authors | Frequency |
|---|---|---|---|
| 1 | 1 | Kanis, JA | 12 |
| 2 | 2 | Ringe, JD | 10 |
| 3 | 3 | Minne, HW | 09 |
| 4 | 4 | Smith, MR | 08 |
| 5 | 4 | Compston, J | 08 |
| 6 | 4 | Hosoi, T | 08 |
| 7 | 5 | Miller, PD | 07 |
| 8 | 5 | Frost, HM | 07 |
| 9 | 6 | Heaney, RP | 06 |
| 10 | 6 | Shiraki, M | 06 |
| 11 | 6 | Wu, XP | 06 |
| 12 | 6 | Yoshimura, N | 06 |
| 13 | 7 | Hayashi, Y | 05 |
| 14 | 7 | Iwamoto, J | 05 |
| 15 | 7 | Lamy, O | 05 |
| 16 | 7 | Nakamura, T | 05 |

| | | | |
|---|---|---|---|
| 17 | 7 | Rahnama, M | 05 |
| 18 | 7 | Rubin, MR | 05 |
| 19 | 7 | Sambrook, PN | 05 |
| 20 | 8 | Blake, GM | 04 |
| 21 | 8 | Diamond, T | 04 |
| 22 | 8 | Diamond, TH | 04 |
| 23 | 8 | Gennari, C | 04 |
| 24 | 8 | Giannini, S | 04 |
| 25 | 8 | Hamdy, RC | 04 |
| 26 | 8 | Johnell, O | 04 |
| 27 | 8 | Koh, LK | 04 |
| 28 | 8 | Lane, NE | 04 |
| 29 | 8 | Roux, C | 04 |
| 30 | 8 | Saag, KG | 04 |
| 31 | 8 | Watts, NB | 04 |
| 32 | 9 | Adami, S | 03 |
| 33 | 9 | Barou, G | 03 |
| 34 | 9 | Barthel, HR | 03 |
| 35 | 9 | Berlemann, U | 03 |

| | | | |
|---|---|---|---|
| 36 | 9 | Bernstein, CN | 03 |
| 37 | 9 | Biskobing, DM | 03 |
| 38 | 9 | Boonen, S | 03 |
| 39 | 9 | Brixen, KT | 03 |
| 40 | 9 | Brumsen, C | 03 |
| 41 | 9 | Doggrell, SA | 03 |
| 42 | 9 | Eastell, R | 03 |
| 43 | 9 | Fisher, AA | 03 |
| 44 | 9 | Francis, RM | 03 |
| 45 | 9 | Fukunaga, M | 03 |
| 46 | 9 | Gennari, L | 03 |
| 47 | 9 | Geusens, PP | 03 |
| 48 | 9 | Gordon, CM | 03 |
| 49 | 9 | Hein, G | 03 |
| 50 | 9 | Inaba, M | 03 |
| 51 | 9 | Justesen, J | 03 |
| 52 | 9 | Kamel, HK | 03 |
| 53 | 9 | Kannus, P | 03 |
| 54 | 9 | Kleerekoper, M | 03 |

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| 55 | 9 | Lane, JM | 03 |
| 56 | 9 | Lau, EM | 03 |
| 57 | 9 | Lee, TC | 03 |
| 58 | 9 | Liao, EY | 03 |
| 59 | 9 | Liel, Y | 03 |
| 60 | 9 | Lin, JT | 03 |
| 61 | 9 | Mehler, PS | 03 |
| 62 | 9 | Melton, LJ | 03 |
| 63 | 9 | Melton, LJ 3rd | 03 |
| 64 | 9 | Mori, S | 03 |
| 65 | 9 | Moyad, MA | 03 |
| 66 | 9 | Mundy, GR | 03 |
| 67 | 9 | Nakatsuka, K | 03 |
| 68 | 9 | New, SA | 03 |
| 69 | 9 | Ohta, H | 03 |
| 70 | 9 | Ormarsdottir, S | 03 |
| 71 | 9 | Pitts, WR | 03 |
| 72 | 9 | Ralston, SH | 03 |
| 73 | 9 | Rosen, CJ | 03 |

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| 74 | 9 | Seeman, E | 03 |
| 75 | 9 | Sohen, S | 03 |
| 76 | 9 | Takata, S | 03 |
| 77 | 9 | Tokita, A | 03 |
| 78 | 9 | Valimaki, MJ | 03 |
| 79 | 9 | Vestergaard, P | 03 |
| 80 | 9 | Werner, P | 03 |
| 81 | 9 | Yamada, Y | 03 |
| 82 | 9 | Abrahamsen, B | 03 |
| 83 | 9 | Amin, S | 03 |
| 84 | 10 | Arden, NK | 02 |
| 85 | 10 | Audran, M | 02 |
| 86 | 10 | Bachrach, LK | 02 |
| 87 | 10 | Baranauskaite, A | 02 |
| 88 | 10 | Bartl, R | 02 |
| 89 | 10 | Bauss, F | 02 |
| 90 | 10 | Becker, A | 02 |
| 91 | 10 | Belkoff, SM | 02 |
| 92 | 10 | Bessant, R | 02 |

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| 93 | 10 | Bianchi, ML | 02 |
| 94 | 10 | Binkley N | 02 |
| 95 | 10 | Bono, CM | 02 |
| 96 | 10 | Boszezyk, BM | 02 |
| 97 | 10 | Boyanov, M | 02 |
| 98 | 10 | Budden, SS | 02 |
| 99 | 10 | Burckhardt, P | 02 |
| 100 | 10 | Canalis, E | 02 |
| 101 | 10 | Caudarella, R | 02 |
| 102 | 10 | Chen, LH | 02 |
| 103 | 10 | Chevalley, T | 02 |
| 104 | 10 | Chlebna-Sokol, D | 02 |
| 105 | 10 | Cooper, C | 02 |
| 106 | 10 | Cornell, CN | 02 |
| 107 | 10 | Cosman, F | 02 |
| 108 | 10 | Crandall, C | 02 |
| 109 | 10 | Cummings, SR | 02 |
| 110 | 10 | Damilakis, J | 02 |
| 111 | 10 | Deal, C | 02 |

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| 112 | 10 | Dempster, DW | 02 |
| 113 | 10 | Deng, HW | 02 |
| 114 | 10 | Dequeker, J | 02 |
| 115 | 10 | Dobnig, H | 02 |
| 116 | 10 | Dolan, AL | 02 |
| 117 | 10 | Duan, Y | 02 |
| 118 | 10 | Ederveen AG | 02 |
| 119 | 10 | El-Agroudy AE | 02 |
| 120 | 10 | Elliott, ME | 02 |
| 121 | 10 | Ettinger, B | 02 |
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| 125 | 10 | Ferrar, L | 02 |
| 126 | 10 | Floreani, A | 02 |
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| 129 | 10 | Fujiwara, S | 02 |
| 130 | 10 | Gafni, RI | 02 |

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| 131 | 10 | Gallagher, JC | 02 |
| 132 | 10 | Gambacciani, M | 02 |
| 133 | 10 | Gold, DT | 02 |
| 134 | 10 | Grigoryan, M | 02 |
| 135 | 10 | Guglielmi, G | 02 |
| 136 | 10 | Harpavat, M | 02 |
| 137 | 10 | Hartman, C | 02 |
| 138 | 10 | Harvey, N | 02 |
| 139 | 10 | Haugeberg, G | 02 |
| 140 | 10 | Hawker, GA | 02 |
| 141 | 10 | Hierholzer, J | 02 |
| 142 | 10 | Higano, CS | 02 |
| 143 | 10 | Hofmann, RT | 02 |
| 144 | 10 | Holzbeierlein, JM | 02 |
| 145 | 10 | Hoshino, S | 02 |
| 146 | 10 | Huang, RY | 02 |
| 147 | 10 | Iba, K | 02 |
| 148 | 10 | Ibanez, R | 02 |
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| 150 | 10 | Inzerillo, AM | 02 |
| 151 | 10 | Ishibashi, H | 02 |
| 152 | 10 | Ito, M | 02 |
| 153 | 10 | Jaglal, SB | 02 |
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| 156 | 10 | Kaptoge, S | 02 |
| 157 | 10 | Karasik, D | 02 |
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| 163 | 10 | Kiebzak, GM | 02 |
| 164 | 10 | Kim HJ | 02 |
| 165 | 10 | Kishimoto, H | 02 |
| 166 | 10 | Koch, CA | 02 |
| 167 | 10 | Koida, M | 02 |
| 168 | 10 | Kubodera, N | 02 |

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| 169 | 10 | Kubota, M | 02 |
| 170 | 10 | Kumeda, Y | 02 |
| 171 | 10 | Kurabgyashi, T | 02 |
| 172 | 10 | Kushida, K | 02 |
| 173 | 10 | Kraenzlin, ME | 02 |
| 174 | 10 | Kramer l | 02 |
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| 179 | 10 | Lambrinoudaki, I | 02 |
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| 183 | 10 | Leong, KH | 02 |
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| 188 | 10 | Linville, DA 2nd | 02 |
| 189 | 10 | Lin, YP | 02 |
| 190 | 10 | Little, DG | 02 |
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| 192 | 10 | Majumdar, SR | 02 |
| 193 | 10 | Matsumoto, T | 02 |
| 194 | 10 | Minisola, S | 02 |
| 195 | 10 | Montagnani, A | 02 |
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| 197 | 10 | Moroni, A | 02 |
| 198 | 10 | Morote, J | 02 |
| 199 | 10 | Narahara, K | 02 |
| 200 | 10 | Nguyen, TV | 02 |
| 201 | 10 | Nishi, Y | 02 |
| 202 | 10 | Neshizawa, Y | 02 |
| 203 | 10 | Orimo, H | 02 |
| 204 | 10 | Otsuka, M | 02 |
| 205 | 10 | Pack, AM | 02 |
| 206 | 10 | Papaiannou, A | 02 |

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| 207 | 10 | Pennisi | 02 |
| 208 | 10 | Pepene, CE | 02 |
| 209 | 10 | Peris P | 02 |
| 210 | 10 | Pfeifer, M | 02 |
| 211 | 10 | Phillips, FM | 02 |
| 212 | 10 | Phillips, P | 02 |
| 213 | 10 | Picard, D | 02 |
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| 216 | 10 | Richy, F | 02 |
| 217 | 10 | Ramagnoli, E | 02 |
| 218 | 10 | Saggese, G | 02 |
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| 220 | 10 | Schapira, D | 02 |
| 221 | 10 | Schneider, DL | 02 |
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| 223 | 10 | Schnitzer, TJ | 02 |
| 224 | 10 | Sinaki, M | 02 |
| 225 | 10 | Solomon, DH | 02 |

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| 226 | 10 | Sone, T | 02 |
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| 228 | 10 | Stepan, JJ | 02 |
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| 230 | 10 | Suyama, H | 02 |
| 231 | 10 | Szule, P | 02 |
| 232 | 10 | Takizawa, H | 02 |
| 233 | 10 | Temple, RJ | 02 |
| 234 | 10 | Theodorou, SJ | 02 |
| 235 | 10 | Tomaszewski, T | 02 |
| 236 | 10 | Torres, A | 02 |
| 237 | 10 | Trevisan, C | 02 |
| 238 | 10 | Trombetti, A | 02 |
| 239 | 10 | Truumees, E | 02 |
| 240 | 10 | Trzcinska, I | 02 |
| 241 | 10 | Tuck, SP | 02 |
| 242 | 10 | Turner, LW | 02 |
| 243 | 10 | Van der Sluis, IM | 02 |
| 244 | 10 | Van Pottelbergh, I | 02 |

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| 245 | 10 | Van Staa, TP | 02 |
| 246 | 10 | Verhage, AH | 02 |
| 247 | 10 | Wallace, LS | 02 |
| 248 | 10 | Wang, X | 02 |
| 249 | 10 | Warden, SJ | 02 |
| 250 | 10 | Watts, N | 02 |
| 251 | 10 | Wehril, FW | 02 |
| 252 | 10 | Weinstein, RS | 02 |
| 253 | 10 | Wilkinson, TJ | 02 |
| 254 | 10 | Wu, J | 02 |
| 255 | 10 | Wuster, C | 02 |
| 256 | 10 | Xia, W | 02 |
| 257 | 10 | Yamaguchi, M | 02 |
| 258 | 10 | Yin, J | 02 |
| 259 | 10 | Yoh, K | 02 |
| 260 | 10 | Zhang, J | 02 |
| 261 | 10 | Zochling, J | 02 |

# Chapter -5

# Application of Bibliometric Laws

# CHAPTER -5

# APPLICATION OF BIBLIOMETRIC LAWS

After the interpretation of data, we have done in previous chapters, the next step is the application of bibliometric laws on the analyzed data to check the validity of these laws.

## 5.1 BRADFORD'S LAW OF SCATTERING

This law states that "if scientific periodicals are arranged in order of decreasing productivity of articles on a give subject that may be divided into a nucleus of periodicals more particularly devoted to the subject and several groups or zones containing the same number of articles as the nucleus when the number of periodicals in the nucleus and succeeding zones will be given as:

$$1 : n : n^2$$

Where '1' is the number of periodicals in the nucleus and 'n'is a multiplier.

To check the validity of this law periodicals were divided into three zones according to their productivity. In the first zone 4 journals contained 521 items, in the second zone 49 periodicals contained 589 items and remaining journals contained 914 items in the third zone. According to this, the periodicals in each zone covered approximately

1/3 items of the total. This analysis shows, phenomenon of scattering of items in different zones of journals.

For all this, data has been taken from table 4.1 and 4.1.1 'Ranking of periodicals' and 'Range of frequency' respectively.

The first zone is the nucleus zones as it contains 4 periodicals, followed by 49 periodicals in the second zone and 433 periodicals in the third zone. The zones thus identified will form an approximately geometric progression as given below:

Present Study shows:

4: 49 : 433

Here $49 \cong 4 \times 11 \cong 44$ (Approximately)

And $433 \cong 4 \times 11 \times 11 \cong 484$ (Approximately)

Therefore, now the series is

$$4: 4 \times 11: 4 \times 11 \times 11$$

On substituting, $11 = n$

We get, $4 : 4n : 4n^2$

i.e. $1 : n : n^2$

i.e. $1 : n : n^2$ (Where 1 is the number of periodicals in the nucleus and 'n' is a multiplier).

Hence the Bradford's law is proved scientifically

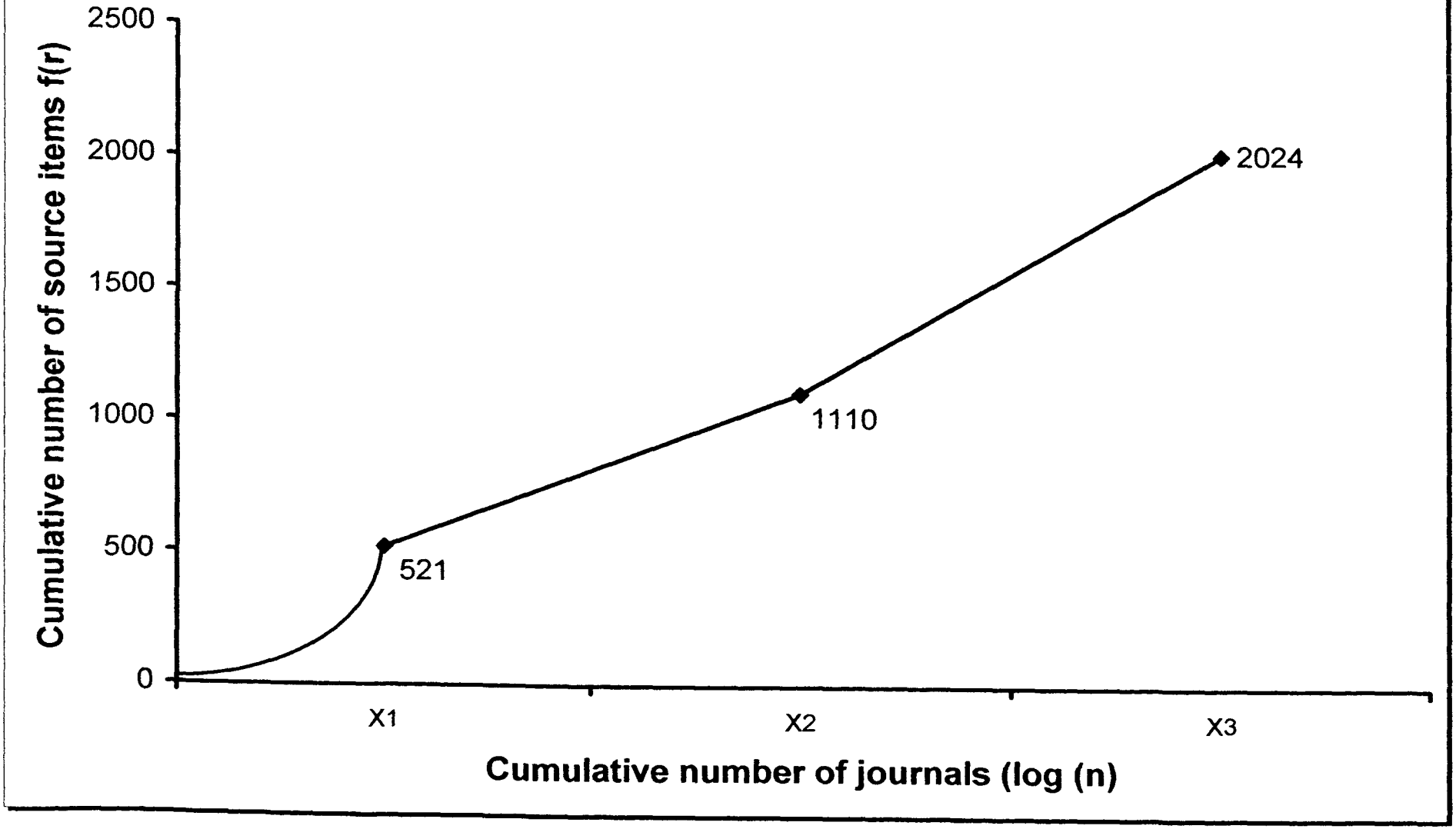
## Table 5.1

## BRADFORD'S TABLE

| S.No. | Number of Journal | Cum. No. of Journal | Number of Items | Cum. No. of Items |
|---|---|---|---|---|
| 1 | 1 | 1 | 265 | 265 |
| 2 | 1 | 2 | 122 | 387 |
| 3 | 1 | 3 | 74 | 461 |
| 4 | 1 | 4 | 60 | 521 |
| **Total** | **4** | **Total** | **521** | |
| 5 | 1 | 5 | 35 | 556 |
| 6 | 2 | 7 | 68 | 624 |
| 7 | 1 | 8 | 32 | 656 |
| 8 | 1 | 9 | 19 | 675 |
| 9 | 1 | 10 | 18 | 693 |
| 10 | 1 | 11 | 17 | 710 |
| 11 | 2 | 13 | 30 | 740 |
| 12 | 3 | 16 | 42 | 782 |
| 13 | 5 | 21 | 60 | 842 |
| 14 | 3 | 24 | 33 | 875 |
| 15 | 5 | 29 | 50 | 925 |

| | | | | |
|---|---|---|---|---|
| 16 | 4 | 33 | 36 | 961 |
| 17 | 9 | 42 | 72 | 1033 |
| 18 | 11 | 53 | 77 | 1110 |
| **Total** | **49** | **Total** | **589** | |
| 19 | 19 | 72 | 114 | 1152 |
| 20 | 22 | 94 | 110 | 1262 |
| 21 | 29 | 123 | 116 | 1378 |
| 22 | 49 | 172 | 147 | 1525 |
| 23 | 113 | 285 | 226 | 1751 |
| 24 | 201 | 486 | 201 | 2024 |
| **Total** | **433** | **Total** | **914** | |

## Diagram 5.1: Bradford's Bibliograph



The number of journals in the nucleus can be obtained by plotting f (r) and log 'n' on semi logarithmic graph paper (a Bibliography), where f (r) is cumulative frequency log 'n' is log of rank of journals as shown in the graph. This graph is drawn with the help of data analyzed and computed in table 5.1

The log value of 4 periodicals in the first zone is 0.602059991 the log value of 49 periodicals in the second zone is 1.69019608 and the log value of 433 periodicals in the third zone 2.636487896.

Taking log 'n' on X-axis and number of items in each zone on Y-axis, a graph was plotted as shown. The bibliograph, thus obtained, is found to be by and large similar to Bradford's Bibliograph.

As the graph begins as a reising curve API and continues as a straight line. The rising part of graph represents the nucleus of highly productive journals. The point P1, P2 and P3 on bibliograph are the boundaries of three equi-productive zones in which three almost the same number of articles as the nucleus represented by 0Y1 = Y1Y2=Y2Y3 derived from and increasingly larger number of journals represented by OX1, X1X2 and X2X3 thus the Bradford law is proved.

## 5.2 LOTKA'S INVERSE LAW

The Lotka's law states that the number of scientists who contribute 'n' paper will be $1/n^2$ of those contributed only one paper. During the present analysis it was observed that 1599 authors have contributed 2024 items. Out of 1599 contributors only 261 authors

have contributed more than one paper and rest 1338 authors have contributed only one paper each given single contribution. However according to Lotka's Law, Single contributors should account for 60% of the total.

Lotka's Law was applied to know the number of authors/ scientist contributing 2 papers 3 papers and 4 papers respectively. Table 5.2 have been consulted for the derivation.

**Table 5.2**

**RANKING OF AUTHORS**

| No. of Authors | No. of Articles |
|---|---|
| 1338 | 1 |
| 334 | 2 |
| 148 | 3 |
| 83 | 4 |

### 5.2.1 Scientists contributing two papers

As we know that the number of authors contribution only one paper are 1338 the number of scientists contributing 2 papers may be calculated by the formula.

$$\text{No. of scientists publishing 'n' paper} = \frac{No.of\ Scientists\ publishing\ 1\ paper}{n^2}$$

On Substituting, n= 2 in the above formula.

$$\text{No. of scientists publishing 2 papers} = \frac{1338}{2^2}$$

$$= \frac{1338}{4}$$

$$= 334.50$$

The number of scientists publishing 2 papers should be 334.50 However, an analysis of data from author table 4.6 indicates that only 180 authors have contributed 2 papers which is for less than the figure, obtained by applying Lotka's Law.

### 5.2.2 Scientist contributing three papers

On Substituting n= 3 in the formula, we get

$$\text{No. of scientists publishing 3 papers} = \frac{1338}{3^2}$$

$$= \frac{1338}{9}$$

$$= 148.67$$

During the analysis it found that only 50 author contributed 3 papers each which is again for less than the calculated figure i.e. 148.67.

### 5.2.3 Scientists contributing four papers

On substituting n = 4 in the formula, we get,

$$\text{No. of scientists publishing 4 papers} = \frac{1338}{4^2}$$

$$= \frac{1338}{16}$$

$$=83.63$$

The analysis of the actual data shows that only 12 authors again contributed 4 papers which of for less than the calculated figure i.e. 83.63.

It may therefore, be conducted that the trends of research now a days have change as compared to the period when at Alfred Lotka formulated his law. At present, interdisciplinary methods of research are common among the scientist and most of the articles are now written in joint authorship. This is why on the basis of the analysis of the present data, it is difficult to testify the validity Lotka's Law

## 5.3 ZIPF'S LAW WORD OCCURRENCE

This law states that 'in a long textual matter, if words are arranged in their decreasing order of frequency, then the rank of any given word of the text will be inversely proportional to the frequency of occurrence of the word' i.e.

$r \times 1/f$ (where 'r' is rank and 'f' is frequency)

Or $r = C \times f$ (Where 'c' is a constant)

$\therefore$ $C = rf$

Taking log on both side

$$\log C = \log (r \times f)$$

Or $$\log C = \log r + \log f$$

To apply this law, the words (terms) were collected from the title of the articles and ranked according to their frequency of occurrence in decreasing order. Only those words occurring 198 times are given in the table.

On the application of this law, it is found that log of frequency of occurrence of words when added to log of their rank, the results are almost same for each word.

The log of frequency of three most important words appeared in the titles on the subject 'Osteoporosis' are given below.

**5.3.1 Word - Osteoporosis**

**Frequency - 1204**

**Rank - 1**

Log of frequency + Log of rank

= log 1204 + log 1

= 3.0806 + 0

= 3.0806

**5.3.2. Word - Bone**

**Frequency - 1078**

**Rank - 2**

Log of frequency + Log of rank

= log 1078 + log 2

= 3.0326 + 0.3010

= 3.3336

**5.3.3 Word - Fracture**

**Frequency - 812**

**Rank - 3**

Log of frequency + Log of rank

= 2.9095+ log 3

= 2.9095+0.4771

= 3.3866

The analysis of table shows that the product of frequency of word occurrence and the rank of the word is almost same in each case. Thus, it is proved that Zipf Law is valid even today.

**Table 5.3**

**RANKING OF WORD OCCURRENCE**

| S.No. | Rank | Word | Frequency | Log (c) |
|---|---|---|---|---|
| 1 | 1 | Osteoporosis | 1204 | 3.0806 |
| 2 | 2 | Bone | 1078 | 3.3336 |
| 3 | 3 | Fracture | 812 | 3.3866 |
| 4 | 4 | Treatment | 615 | 3.3909 |
| 5 | 5 | Disease | 423 | 3.3253 |
| 6 | 6 | Prevention | 345 | 3.3159 |
| 7 | 7 | Density | 198 | 3.1417 |

# Chapter -6

# Summary and Conclusion

# CHAPTER – 6

# SUMMARY AND CONCLUSION

Bibliometric methods based on statistical analysis can be used for eliminating low-quality literature and to select a small portion of significant, reliable and relevant high quality publication. The analysis can be done by observation, measurement and grouping.

This study is conducted in the date collected from three volumes of ***Index Medicus*** **(i.e. 2002, 2003, 2004).**

The main objective of the bibliometric study is to know the leading countries, contributors and form of the documents, languages and core journals, etc on the subject "Osteoporosis"

The whole study was conducted by using bibliometric techniques. After the collection of data from *Index Medicus*. It was analyzed and results were shown in the form of table and graphs. Lastly Bibliometrics laws were tested.

The following are the major findings of the study:

1. From the study it is found that the journal titled **"Osteoporos Int."** published from England is most productive, reporting 265 itmes ie. 13.09% of the total literature. This is followed by **"Nippon Rinsho"** published from Japan with 122 items i.e. 6.02%, **J Bone Miner Res** published from U.S. with 74 items

3.66% and Bone published from U.S. with 60 items i.e. 2.96% of the total literature.

2. The country-wise distribution of items concluded that the most of the literature on the subject "Osteoporosis" was found to be published from 42 countries U.S. is the leading country with 844 (41.69%) items of the total. This is followed by England and Japan 471 (23.27%) 200 (9.88%) items respectively.
3. From the subject analysis it is found that 526 (25.99%) items belong to the subject **"Metabolism"**. It is followed by the subject **'Medicine'** and **'Medical Sciences – Orthopedics'** with 478 (23.62%) and 147 (7.26% ) items respectively.
4. The analysis of year-wise distribution concludes that highest amount of documents were produrced in the year 2003 with a total of 705 (34.83%) references as the subject "Osteoporosis" the other productive years 2002 and 2004 accounting for 622 (30.73%) and 392 (19.37%) items respectively. This shows the current information published by *Index Medicus*.
5. The language-wise distribution show that 77.95% of the literature in the field "Osteoporosis", published in **English** language, 7.41% published in **Japanese** language 3.45% published in **German** language where other 6.77% literature is published in other languages.
6 The study regarding the form-wise distribution of items concluded that the most of the literature on the subject-was published in the form of **articles,** out of total 1816 (89.72%) items published as articles. The rest are followed by **letters,**

**editorial, comment** with 100, (4.94%) and 46 (2.27%) items respectively.

7. Author-wise distribution shows that 1338 (66.10%) were contributed by single authors and 686 (33.89%) were written by more than one authors.

The most productive authors in the field "Osteoporosis" are as follows:

a. **Kanis, JA (12 items)**
b. **Ringe, J.D (10 items)**
c. **Minne, HW (09 items)**

8. On application of bibliometric laws to the collected data it was that Bradford's Law of scattering and Zipf's Law of word occurrence are still valid. However, Lotka's inverse square law could not be testified probably due to change in research trends in present days from joint authorship to multiple authorship.

Finally it may be concluded that bibliometric is a very well established technique of identification describing some of the characteristics of literature. This study helps the librarian or information scientists in deriving certain conclusions that will help them in taking certain steps in the smooth running of library and also in satisfying the need of the users to the great extent.

At last, Bradford's and Zipf's law were proved. However, Lotka's law could not be testified probably due to change in research trend in present days.

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